

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>			1. CONTRACT ID CODE N/A	PAGE 1 OF 75 PAGES
2. AMENDMENT/MODIFICATION NO. 0005	3. EFFECTIVE DATE 18 SEP 03	4. REQUISITION/PURCHASE REQ. NO. N/A		5. PROJECT NO. (If applicable)
6. ISSUED BY CODE		7. ADMINISTERED BY (If other than Item 6) CODE		
DEPARTMENT OF THE ARMY CORPS OF ENGINEERS SACRAMENTO 1325 J STREET SACRAMENTO, CALIFORNIA		SEE ITEM 7		

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)		(√)	9A. AMENDMENT OF SOLICITATION NO.  DACW07-03-B-0006
		×	9B. DATED (SEE ITEM 11) 1 AUG 2003
			10A. MODIFICATION OF CONTRACTS/ORDER NO. N/A
			10B. DATED (SEE ITEM 13) N/A
CODE	FACILITY CODE		

# 11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

# 12. ACCOUNTING AND APPROPRIATION DATA (If required)

# 13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(√)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

**E. IMPORTANT:** Contractor ☐ is not, ☐ is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)  
UPGRADE OF MAINLINE RAILROAD SYSTEM, PETALUMA MAINLINE RAILROAD APPROACH, PETALUMA RIVER  
SONOMA COUNTY, CALIFORNIA

2 ENCLS 1) PRICING SCHEDULE (2 PAGES), 00100 (1 PAGE), 01010 (6 PAGES), 01270 (19 PAGES), AND 05650 (45 PAGES) .

2) DRAWINGS SHEETS 8, 9, AND FIGURES 1 & 2.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer)	16C. DATE SIGNED

0020	REMOVE BALLAST	1,900*	CY	\$_____	\$_____
0021	REMOVE (E) RAILROAD TIES AND TRACK	<b>3,476*</b>	TF	\$_____	\$_____
0022	REMOVE AND RELOCATE #10 TURNAROUT	2	EA	\$_____	\$_____
0023	REMOVE (E) BRIDGE	125*	LF	\$_____	\$_____
0024	TANK DEMO, FILL W/CLSM	150*	CY	\$_____	\$_____
0025	12" RCP, CLASS 3	343*	LF	\$_____	\$_____
0026	18" RCP, CLASS 3	495*	LF	\$_____	\$_____
0027	PRECAST SDMH 36"	6	EA	\$_____	\$_____
0028	CATCH BASIN, CURB INLET TYPE 33" X 24"	5	EA	\$_____	\$_____
0029	CATCH BASIN, SQUARE 24" X 24"	4	EA	\$_____	\$_____
0030	6" PERFORATED STEEL DRAIN PIPE	1,900*	LF	\$_____	\$_____
0031	3" SDR 35, PVC	300*	LF	\$_____	\$_____
0032	2" SDR 35, PVC	300*	LF	\$_____	\$_____
0033	TRENCH EXCAVATION, BEDDING BACKFILL & COMPACTION	630*	CY	\$_____	\$_____
0034	12" PVC, CLASS 150 AWWA C900	290*	LF	\$_____	\$_____
0035	12" X 18" TEE	1	EA	\$_____	\$_____
0036	12" GATE VALVE	1	EA	\$_____	\$_____
0037	8" GATE VALVE	2	EA	\$_____	\$_____
0038	12" X 8" REDUCER	1	EA	\$_____	\$_____
0039	DI ADAPTER, MJ X MJ, 12"	1	EA	\$_____	\$_____
0040	36" HORIZONTAL BORING, CASING, 0.563" WALL THICKNESS	27*	LF	\$_____	\$_____

0061	8' CAST-IN-PLACE RETAINING WALL	327*	LF	\$_____	\$_____
0062	FILL, BORROW (RAILROAD)	11,646*	CY	\$_____	\$_____
0063	BASE COURSE - CRUSHED 3/4" STONE (RAILROAD)	3,240*	SY	\$_____	\$_____
0064	CONCRETE RAILROAD GRADE CROSSING	<b>250*</b>	LF	\$_____	\$_____
0065	WOOD RAILROAD GRADE CROSSING	30*	LF	\$_____	\$_____
0066	RAILROAD BALLAST, CRUSHED STONE	6,410*	TON	\$_____	\$_____
0067	RAILROAD TIES, WOOD PRESSURE TREATED	2,694*	EA	\$_____	\$_____
0068	132 LB PRIME RAIL	4,490*	TF	\$_____	\$_____
0069	DRIVEWAY CUT	240*	SF	\$_____	\$_____
0070	CURB RAMP	2	EA	\$_____	\$_____
0071	CONCRETE BRIDGE MODIFICATIONS	2,200*	SF	\$_____	\$_____
0072	CONCRETE BRIDGE APPROACH	550*	SF	\$_____	\$_____
0073	CONCRETE CURB AND GUTTER (INCL. BASE ROCK)	2,090*	LF	\$_____	\$_____
0074	CONCRETE SIDEWALK (INCL. BASE ROCK)	5,500*	LF	\$_____	\$_____
0075	CONCRETE CURBING (INCL. BASE ROCK)	200*	LF	\$_____	\$_____
0076	GUARD RAIL (KRAIL)	60*	LF	\$_____	\$_____
0077	RAILROAD TURNOUT, #10 132LB TURNOUT	3	EA	\$_____	\$_____
0078	RAILROAD TURNOUT, #10 132LB TURNOUT RELAY	3	EA	\$_____	\$_____
<b>0079</b>	<b>8" SDR 26, PVC PIPE</b>	<b>46</b>	<b>LF</b>	<b>\$_____</b>	<b>\$_____</b>
<b>0080</b>	<b>24" CMP PIPE</b>	<b>24</b>	<b>LF</b>	<b>\$_____</b>	<b>\$_____</b>

0081            METAL GUARD RAIL            90            LF            \$ \_\_\_\_\_            \$ \_\_\_\_\_

**SUBTOTAL ESTIMATED PRICE**    \$ \_\_\_\_\_  
**(ITEMS 0001 THRU 0081)**

**OPTION**

0082            TEMPORARY TRACK            1            LUMP SUM    LUMP SUM    \$ \_\_\_\_\_

**TOTAL ESTIMATED PRICE**    \$ \_\_\_\_\_  
**(ITMS 0001 THRU 0082)**

\* QUANTITY IS AN ESTIMATED AMOUNT. SEE SECTION 00700, FAR 52.211-18, FOR VARIATION IN ESTIMATED QUANTITY CONTRACT CLAUSE.

1. Prices must be submitted on all individual items of this Pricing Schedule. Failure to do so may be cause for rejection of bids.

2. If a modification to a price based on unit price is submitted which provides for a lump sum adjustment to the total estimated price, the applications of the lump sum adjustment to each unit price in the Pricing Schedule must be stated. If it is not stated, the bidder/offeror agrees that the lump sum adjustment shall be applied on a pro rata basis to every unit price in the Pricing Schedule.

3. The bidder/offeror shall distribute his indirect costs (overhead, profit, bond, etc.) over all the items in the Pricing Schedule. The Government will review all submitted Pricing Schedules for any unbalancing of the items. Any submitted Pricing Schedule determined to be unbalanced may be considered nonresponsive and cause the bidder to be ineligible for award.

4. The lump sum, "LS", line items above are not "estimated quantity" line items and therefore are not subject to the Variation in Quantity contract clause.

5. EFARS 52.214-5000    ARITHMETIC DISCREPANCIES

(a) For the purpose of initial evaluation of bids, the following will be utilized in the resolving arithmetic discrepancies found on the face of Pricing Schedule as submitted by the bidder:

- (1) Obviously misplaced decimal points will be corrected;
- (2) Discrepancy between unit price and extended price, the unit price will govern;
- (3) Apparent errors in extension of unit prices will be corrected;
- (4) Apparent errors in addition of lump-sum and extended prices will be corrected.

(b) For the purpose of bid evaluation, the Government will proceed on the assumption that the bidder intends the bid to be evaluated on basis of the unit prices, the totals arrived at by resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.

(c) These correction procedures shall not be used to resolve any ambiguity concerning which bid is low.

6. The successful bidder/offeror grants the options listed in the Pricing Schedule to the Government. This option may be exercised any time up to (30) days after receipt of Notice to Proceed. Exercise of the option occurs upon mailing of written notice to the Contractor. Exercise will be made by the Contracting Officer. The price for exercise of the option includes all work and effort associated with the scope of that item. No additional time for contract completion will be allowed when an option is exercised. The given contract completion time was formulated to include time necessary to perform all option work.



contract awarded as a result of this solicitation. Accordingly, offerors or quoters are urged and expected to inspect the site where the work will be performed.

(b) An organized site visit has been scheduled for August 20, 2003 @ 10:00 a.m.

(c) Participants will meet at the Mainline Site located at Lakeville and Madison Street, Petaluma, California.

(End of provision)

#### 52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es): <http://www.acqnet.gov>.

(End of provision)

#### 52.252-3 ALTERATIONS IN SOLICITATION (APR 1984)

Portions of this solicitation are altered as follows: N/A.

#### 52.252-5 AUTHORIZED DEVIATIONS IN PROVISIONS (APR 1984)

(a) The use in this solicitation of any Federal Acquisition Regulation (48 CFR Chapter 1) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the provision.

(b) The use in this solicitation of any Department of Defense FAR Supplement (48 CFR Chapter 2) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of provision)

#### 52.217-5 EVALUATION OF OPTIONS (JUL 1990)

*(a) Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. Evaluation of options will not obligate the Government to exercise the option(s).*

*(b) The Government may reject an offer as nonresponsive if it is materially unbalanced as to prices for the basic requirement and the option quantities. An offer is unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.*

(End of provision)

## SECTION 01010

## SUMMARY OF WORK

## PART 1 GENERAL

## 1.1 PROJECT DESCRIPTION

The work includes furnishing all labor, material, and equipment to relocate the mainline railroad track crossing the Petaluma River. The work generally involves constructing: retaining walls, floodwall, storm drains, water line, earth fills, track approach, relocating signals and warning devices for an at-grade crossing, signs and striping, curb, gutter, sidewalk, fencing, railroad track installation, relocation of existing railroad track and switches, demolition of the existing wood railroad trestle, paving, raising utilities, concrete bridge modifications, and other associated work to relocate a mainline railroad track.

*The Petaluma Mainline Railroad is currently not in operation. It is anticipated that intermittent work trains will begin operating in March 2004. It is further anticipated that commercial trains will begin operation in May 2004. It is the intent of this contract to complete all track related construction prior to train operation. However, if construction of the Mainline is not complete prior to train operation, the Contractor shall construct temporary tracks at the north and south tie-in locations to allow for train operation.*

*Figure 1 and Figure 2 have been included in the Bid Documents to illustrate the proposed temporary tracks.*

*South Temporary Track: On the south end, it is proposed that the existing mainline track be relocated to the southbound lane of Lakeville Street to create the temporary track. A minimum of 90-pound rail shall be used, if the existing mainline track is not re-used. The track would be placed on a minimum of 0.5 feet of No. 5 AREMA ballast (see section Figure 1). Final cutover of the new mainline track to the existing mainline at Washington Street shall be made within the time allowed by the Contract Documents.*

*North Temporary Track: On the north end, the existing siding track is proposed for use as the temporary track. This will allow construction of the new mainline track, with the exception of approximately 500 feet, from roughly Station 218+50 to 223+50. Final closure of the new mainline track (approx Sta 218+50 to 223+50) shall be made within the time allowed by the Contract Documents, and concurrent with the south cutover.*

*Temporary Tracks - General: The proposed maximum train speed is 5 mph. Contractor shall submit a comprehensive and detailed plan for the temporary tracks to the Corps for review.*

*The Bidding Schedule has been revised to include the Bid Option - Temporary Track, which shall include all work necessary to furnish, install and maintain temporary tracking for train conveyance through the project area.*

*It is anticipated that up to 12 train trips per month will occur between March and April 2004. After April 2004, up to 48 (commercial) train trips per month should be expected.*

Note: All work under specifications shall be performed in accordance with the provisions of EM 385-1-1, Army Corps of Engineers, Safety and Health Requirements Manual, dated September 3, 1996.

The work requires coordinating with the Railroad Agencies (including NWPY), Petaluma, and owners of existing utilities on site.

Railroad Agency	Point of Contact	Telephone No.
Golden Gate Bridge Highway and Transportation District	Alan R. Zahradnik	(415) 257-4475
North Coast Rail Authority	Douglas M. Christy	(707) 463-3280
Northwestern Pacific Railway Co. (NWPY)	John A. Darling	(707) 459-7514

#### 1.2 EXISTING WORK

- a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.
- b. Repair or replace portions of existing work, which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existing before new work started.

#### 1.3 PERMITS

Contractor is required to conform to the requirements of all permits.

- a. Right-of-Entry Permit from Northwestern Pacific Railroad Authority is required to be obtained by the Contractor; a sample permit is attached in the appendix. Point of Contact: Alan R. Zahradnik, 1011 Andersen Drive, San Rafael, CA 94901-5381.
- b. Fish and Game Permit
- c. Regional Water Quality Control Board Permit

#### 1.4 SPECIAL SCHEDULING REQUIREMENTS

The work involves the relocation of the mainline railroad track to complete a portion of the Petaluma Flood Control Project. The work will be phased to allow minimum disruption of the railroad, city streets, and private property access.

- a. Work within the stream channel is restricted due to protected native fish species from August 1st to November 1st per the Corps of Engineers Permit.
- b. Traffic Detour shall be in place and approved by Contracting Officer prior to mainline railroad cut-over. Cutover shall be

performed prior to resumption of regular train operation, if at all possible.

- c. Contractor shall coordinate with and not unreasonably interfere with train operations at any time. Railroad closure and associated construction scheduling shall conform to the following: Prior to March 1, 2003, the existing rail may remain out of service for up to ONE 60-day closure. Between March 1, 2004 and May 31, 2004, the maximum shutdown interval shall be 7 days. After June 1, 2003, the maximum shutdown interval shall be 48 hours, with the exception of TWO 4-day closures around weekends. The closures for final cutover construction shall be coordinated and scheduled with the railroad owner and operator a minimum of 5 days in advance of the first proposed day of closure. A minimum "open" train operation interval of 72 hours shall be provided between any two consecutive conflicts (for example the temporary tracks) and complete the new mainline track construction for train operation.*

#### 1.5 UTILITY CUT OVERS AND INTERRUPTIONS

- a. Make utility cut-overs and interruptions after normal working hours or on Saturdays, Sundays, and holidays. Conform to procedures required in the paragraph "Work Outside Regular Hours."
- b. Ensure that new utility lines are complete, except for the connection before interrupting existing service.
- c. The utility will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer giving reasonable advance notice when such operation is required.

#### 1.6 WORKING HOURS

Regular working hours shall consist of 7 a.m. to 3:30 p.m., Monday through Friday, excluding holidays.

##### 1.6.1 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Provide written request at least 7 days prior to such work to allow arrangements to be made for inspecting the work in progress.

#### 1.7 SALVAGED MATERIAL

The mainline railroad material salvaged shall be used for the construction of the siding. This material includes the tie plates, tie rods, switch, and rail that meet the requirements of AREMA for used material.

#### 1.8 COORDINATION WITH PRIVATE PROPERTIES AND ACCESS

- a. Notice shall be given to each private landowner 7 days prior to entering their property.
- b. Clover-Stornetta trucking shall have access through the job site at all times. Truck traffic may be held up to 15 minutes.

c. Access for parking at the southern corner of Madison and Lakeville Streets is required.

d. The property on the south side of the Lakeville Bridge shall have access through Madison Street extension.

#### 1.9 UTILITIES

Contact the following for utility coordination:

- a. Optical Fiber: Q-west, Jason W. Johns, (916) 788-1042 (office)
- b. Telephone: Deb Barrios, (707) 575-2077
- c. Cable TV: Comcast, Paul Alabona, (707) 588-5511
- d. Gas: PG&E, Pat Hayes, (707) 765-5162
- e. Electric: PG&E, Pat Hayes, (707) 765-5162
- f. Sewer/Water: City of Petaluma, Steve Simmons, (707) 778-4392
- g. Underground Service Alert (USA), (800) 642-2444

#### 1.10 MEETINGS

a. Pre-construction meeting will be held after Award of Contract and prior to Notice to Proceed. Contracting Officer shall conduct the meeting to discuss and develop work procedures, coordination of other entities, and permits to begin work. The initial project schedule will be discussed.

b. Weekly meetings will be held to discuss active items of work, future work, coordination, and other items.

c. Contractor shall provide a copy of the Accident Prevention Plan 7 days prior to the scheduled conference for government authority review and acceptance.

#### 1.11 PRECEDENCE

In the event of conflict between the Standard Specifications, the Standard Plans, General Provisions, Special Provisions, and other contract documents, the document of precedence shall be determined in the following order:

- \* Special Provisions
- \* General Provisions
- \* Mainline Railroad Bridge Replacement Plans
- \* Standard City of Petaluma Plans and Specifications
- \* California Standard Specifications and Plans

#### 1.12 SURVEYS

The Contractor will furnish grade and alignment survey that will incorporate the establishment of sufficient base line for layout, benchmarks, and cut stakes from which the Contractor can construct the project. The site survey control is shown in the plans.

### 1.13 DEFINITIONS

The Contracting Officer term referenced in the Special Provisions is synonymous with Engineer and Contracting Officer Representative.

### 1.14 MODIFICATIONS TO THE GENERAL PROVISIONS

Time of Completion and Liquidated Damages, Section 6, Paragraph E. The amount of liquidated damages is revised to the sum of two thousand (\$2,000.00) dollars per day for each and every day's delay beyond the time prescribed to complete the work.

### 1.15 SUPERINTENDENCE

The Contactor shall designate in writing before starting work, an authorized representative who shall have the authority to represent and act for the Contractor. When the Contractor is comprised of 2 or more persons, firms, partnerships, or corporations functioning on a joint venture basis, Contractor shall designate in writing before starting work the name of one authorized representative who shall have the authority to represent and act for the Contractor. The authorized representative shall be present at the project site at all times work is actually in progress. If the work is in progress and the authorized representative is not on site, the USACE reserves the right to stop the work at no cost to the USACE.

Once the work begins, the authorized representative shall keep the USACE Engineer informed of the Contractor's schedule. The Engineer shall have at least 24-hour advance notice of all work on a daily basis, including subcontractor's work. If the Contractor fails to notify the Engineer, the Engineer reserves the right to stop the work at no cost to the USACE.

The Contractor shall leave emergency telephone numbers with the City Fire Department, City Police Department, and City Public Works Department.

### 1.16 CONTRACTOR'S QUALITY CONTROL AND GOVERNMENT QUALITY ASSURANCE REQUIREMENTS

The Contractor is responsible for his quality control as indicated in the San Francisco District's Quality Management Plan. The government is responsible for performing quality assurance to confirm that the Contractor is performing his quality control responsibilities.

### 1.17 TESTING LABORATORIES

All laboratories involved in CQC and QA testing must be inspected and validated by the Corps of Engineers' Materials Testing Center (MTC) located in Vicksburg, Mississippi. The Contractor should allow at least 90 days for the laboratory inspection and validation process.

As an alternative, the Corps of Engineers will accept testing labs that meet state or federal standards.

### 1.18 RECORD DRAWINGS

At the completion of the project, the Contractor shall produce As-Built drawings and submit the As-Built drawings to the Corps of Engineers electronically using the latest version of AutoCAD.

## 1.19 FEDERAL AND STATE COMPLIANCE

- a. Contractor shall be obligated to meet the safety requirements under 49 CFR Section 214, Railroad Workplace Safety.
- b. Contractor shall comply with the requirements of California Public Utilities Commission (CPUC) General Order 88-A.
- c. Contractor shall notify carrier's dispatcher of any incident which involves or affects carrier employees, the tracks, or passage of trains and/or equipment in accordance with the FRA (49 CFR Section 225) and the CPUC (General Order No. 28.B and 161.)

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

## **SECTION 01270**

### **MEASUREMENT AND PAYMENT**

#### **1.01 SCOPE**

- A. Payment for the various items of the Bid Sheets, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of work as specified and shown on the Drawings, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the California Division of Industrial Safety. No separate payment will be made for any item that is not specifically set forth in the Bid Sheet(s), and all costs therefor shall be included in the prices named in the Bid Sheet(s) for the various appurtenant items of work.

#### **2.00 BID SCHEDULE**

- A. All pay line items will be paid for at the unit prices named in the Bid Sheet(s) for the respective items of work. The quantities of work or material stated as unit price items on the Bid Sheet(s) are supplied only to give an indication of the general scope of the Work; the District does not expressly nor by implication agree that the actual amount of work or material will correspond therewith, and reserves the right after award to increase or decrease the quantity of any unit price of any major item of work by an amount up to and including 25 percent of any major bid item, without a change in the unit price, and shall have the right to delete any bid item in its entirety, or to add additional bid items up to and including an aggregate total amount not to exceed 25 percent of the contract price.
- B. Quantity variations in excess of the allowable quantity changes specified herein shall be subject to the provisions of Article 12 of the General Conditions.

#### **2.01 MOBILIZATION (Bid Item No. 0001)**

- A. Measurement for payment for mobilization will be based upon completion of such work as a lump sum, non-proratable pay item, and shall require completion of all of the items listed in 2.02 B during the first 25 calendar days following Notice to Proceed.
- B. Payment for Mobilization will be made at the lump sum allowance named in the Bid Sheet(s) under Item No. 1, which price shall constitute full compensation for all such work. Payment for mobilization will be made in the form of a single, lump-sum, non-proratable payment, no part of which will be approved for payment under the Contract until all mobilization items listed herein have been completed as specified. The scope of the work included under Pay Item No. 1 shall include the obtaining of all bonds, insurance, and permits; moving onto the site of all plant and equipment; and the furnishing and erecting of plants, temporary buildings, and other construction facilities;



all as required for the proper performance and completion of the Work. Mobilization shall include but not be limited to the following principal items:

1. Moving on to the site of all Contractor's plant and equipment required for first month's operations.
  2. Installing temporary construction power, wiring, and lighting facilities per Section 01510 "Temporary Utilities".
  3. Establishing fire protection system per Section 01510 "Temporary Utilities".
  4. Developing and installing construction water supply per Section 01510 "Temporary Utilities".
  5. Providing on-site sanitary facilities and potable water facilities per Section 01510 "Temporary Utilities".
  6. Furnishing, installing, and maintaining all storage buildings or sheds required for temporary storage of products, equipment, or materials that have not yet been installed in the Work. All such storage shall meet manufacturer's specified storage requirements, and the specific provisions of the specifications, including temperature and humidity control, if recommended by the manufacturer, and for all security per Section 01660 "Materials and Equipment".
  7. Arranging for and erection of Contractor's work and storage yard per Section 01550 "Site Access and Storage".
  8. Obtaining and paying for all required bonds, insurance, and permits per Article 6.6 of the Supplementary General Conditions.
  9. Posting all OSHA required notices and establishment of safety programs.
  10. Submittal of required Construction Schedule as specified in Section 01330 "Contractor Submittals".
  11. Furnishing, installing, and maintaining all off-site storage areas as required, including all requirements of the Zoning and/or Use Permit.
- C. In addition to the requirements specified above, all submittals shall conform to the applicable requirements of Section 01330 "Contractor Submittals".
- D. No payment for any of the listed mobilization work items will be made until all of the listed items have been completed, as specified, to the satisfaction of the Engineer.
- E. The aforementioned amount will be retained by the District as the agreed, estimated value of completing all of the mobilization items listed. Any such retention of money for failure to complete all such mobilization items as a lump-sum item shall be in addition to the

retention of any payments due to the Contractor as specified in Article 14 of the General Conditions.

**2.02 TRAFFIC CONTROL (Bid Item No. 0002)**

- A. Measurement of payment for traffic control and construction area signs will be based upon completion of all the necessary measures to temporarily control, detour, or stage traffic during construction and all other related work per the Contract Documents.
- B. Payment for traffic control and construction area signs will be made at the lump sum (LS) price named in the Bid Sheet under Item No. 0002, which price shall constitute full compensation for the completion of all such work as required per the Contract Documents.

**2.03 EROSION CONTROL (Bid Item No. 0003)**

- A. Measurement of payment for installing erosion control measures will be based upon installation per the Contract Documents.
- B. Payment for installing erosion control measures will be made at the lump sum (LS) prices named in the Bid Sheet under Item No. 0003, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.04 SURVEY MONUMENTS (Bid Item No. 0004)**

- A. Measurement of payment for installing survey monuments will be based upon installation per the Contract Documents.
- B. Payment for installing survey monuments will be made at the lump sum (LS) price named in the Bid Sheet under Item No. 0004, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.05 CLEAR AND GRUB/TREE REMOVAL (Bid Item No. 0005)**

- A. Measurement of payment for clear and grub/tree removal will be based upon the construction area and tree removal per the Contract Documents.
- B. Payment for clear and grub/tree removal will be made at the lump sum (LS) price named in the Bid Sheet under Item No. 0005, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.06 SIGNALIZATION AND APPURTENANCES (Bid Item No. 0006)**

- A. Measurement of payment for installing signalization and appurtenances will be based upon installing per the Contract Documents.

- B. Payment for installing signalization will be made at the lump sum (LS) price named in the Bid Sheet under Item No. 0006, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.07 RELOCATE GATE (Bid Item No. 0007)**

- A. Measurement of payment for relocating gates will be based upon installing per the Contract Documents.
- B. Payment for relocating gates will be made at the ~~lump sum (LS)~~ **unit bid price *per each (EA)*** named in the Bid Sheet under Item No. 0007, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.08 REMOVE AND RELOCATE –FIRE HYDRANT (Bid Item No. 0008)**

- A. Measurement of payment for removal and relocation of the fire hydrant will be based per the Contract Documents.
- B. Payment for removal and relocation of the fire hydrants will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0008, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.09 REMOVE CHAIN LINK FENCE (Bid Item No. 0009)**

- A. Measurement of payment for removal of the existing chain link fence will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of the existing chain link fence will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0009, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.10 REMOVE BOLLARDS (Bid Item No. 0010)**

- A. Measurement of payment for removal of the existing bollards will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of the existing bollards will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0010, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.11 DEMOLITION (E) VALLEY GUTTER (Bid Item No. 0011)**

- A. Measurement of payment for demolition of existing valley gutter will be based upon complete removal/demolition per the Contract Documents.

- B. Payment for removal of the existing chain link fence will be made at the unit bid prices per square yard (SY) named in the Bid Sheet under Item No. 0011, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.12 DEMOLITION (E) SIDEWALK (Bid Item No. 0012)**

- A. Measurement of payment for demolition of existing sidewalk will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for demolition of the sidewalk will be made at the unit bid prices per square yard (SY) named in the Bid Sheet under Item No. 0012, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.13 DEMOLITION (E) CURB AND GUTTER (Bid Item No. 0013)**

- A. Measurement of payment for demolition of existing curb and gutter will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for demolition of the curb and gutter will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0013, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.14 REMOVE (E) 6-INCH TO 18-INCH CONCRETE PIPE (Bid Item No. 0014)**

- A. Measurement of payment for removal of existing 6-inch to 18-inch concrete pipe will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of the existing 6-inch to 18-inch concrete pipe will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0014, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.15 REMOVE (E) STORM DRAIN STRUCTURES (Bid Item No. 0015)**

- A. Measurement of payment for removal of existing storm drain structures will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of the existing storm drain structures will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0015, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.16 SAW CUTTING (Bid Item No. 0016)**

- A. Measurement of payment for saw cutting will be based upon complete removal/demolition per the Contract Documents.

- B. Payment for removal of the saw cutting will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0016, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.17 GRINDING AND CLEANING AC PAVEMENT (Bid Item No. 0017)**

- A. Measurement of payment for grinding and cleaning AC pavement will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for grinding and cleaning AC pavement will be made at the unit bid prices per square yard (SY) named in the Bid Sheet under Item No. 0017, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.18 REMOVE PAVEMENT (Bid Item No. 0018)**

- A. Measurement of payment for removal of pavement will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of pavement will be made at the unit bid prices per square yard (SY) named in the Bid Sheet under Item No. 0018, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.19 REMOVE SIGNS AND SUPPORT (Bid Item No. 0019)**

- A. Measurement of payment for removal of signs and supporting structures will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of signs and supporting structures will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0019, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.20 REMOVE BALLAST (Bid Item No. 0020)**

- A. Measurement of payment for removal of ballasts will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of ballasts will be made at the unit bid prices per cubic yard (CY) named in the Bid Sheet under Item No. 0020, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.21 REMOVE (E) RAILROAD TIES AND TRACK (Bid Item No. 0021)**

- A. Measurement of payment for removal of existing railroad ties and track will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of existing railroad ties and track will be made at the unit bid prices per track foot (TF) named in the Bid Sheet under Item No. 0021, which price

shall constitute full compensation of all such work as required per the Contract Documents.

**2.22     *SALVAGE NO.9 TURNOUT* ~~REMOVE AND RELOCATE #10 TURNOUT~~ (Bid Item No. 0022)**

- A. Measurement of payment for removal and relocation of the ~~#10~~ #9 turnout will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal and relocation of the ~~#10~~ #9 turnout will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0022, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.23     REMOVE (E) BRIDGE (Bid Item No. 0023)**

- A. Measurement of payment for removal of existing bridge will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for removal of existing bridge will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0023, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.24     TANK DEMO, FILL W/CLSM (Bid Item No. 0024)**

- A. Measurement of payment for tank demo will be based per the Contract Documents.
- B. Payment for removal of existing bridge will be made at the unit bid prices per cubic yard (CY) named in the Bid Sheet under Item No. 0024, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.25     12-INCH RCP, CLASS 3 (Bid Item No. 0025)**

- A. Measurement of payment for installing the 12-inch RCP, class 3 will be based upon per Construction Documents.
- B. Payment for installing the 12-inch RCP, class 3 will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0025, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.26     18-INCH RCP, CLASS 3 (Bid Item No. 0026)**

- A. Measurement of payment for installing the 18-inch RCP, class 3 will be based upon per Construction Documents.
- B. Payment for installing the 18-inch RCP, class 3 will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0026, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.27      PRECAST SDMH 36" (Bid Item No. 0027)**

- A. Measurement of payment for installing the pre-cast SDMH 36" will be based upon per Construction Documents.
- B. Payment for installing the pre-cast SDMH 36" will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0027, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.28      CATCH BASIN, CURB INLET TYPE 33"x 24" (Bid Item No. 0028)**

- A. Measurement of payment for installing the catch basin 33" x 24" will be based upon per Construction Documents.
- B. Payment for installing the catch basin 33" x 24" will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0027, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.29      CATCH BASIN, SQUARE 24"x 24" (Bid Item No. 0029)**

- A. Measurement of payment for installing the catch basin 24" x 24" will be based upon per Construction Documents.
- B. Payment for installing the catch basin 24" x 24" will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0029, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.30      6-INCH PERFORATED STEEL DRAIN PIPE (Bid Item No. 0030)**

- A. Measurement of payment for installing the 6-inch perforated steel drainpipe will be based upon per Construction Documents.
- B. Payment for installing the 6-inch perforated steel drain pipe will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0030, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.31      3-INCH SDR 35, PVC (Bid Item No. 0031)**

- A. Measurement of payment for installing the 3-inch SDR 35, PVC will be based upon per Construction Documents.
- B. Payment for installing the 3-inch SDR 35, PVC will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0031, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.32 2-INCH SDR 35, PVC (Bid Item No. 0032)**

- A. Measurement of payment for installing the 2-inch SDR 35, PVC will be based upon per Construction Documents.
- B. Payment for installing the 2-inch SDR 35, PVC will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0032, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.33 TRENCH EXCAVATION, BEDDING BACKFILL & COMPACTION (Bid Item No. 0033)**

- A. Measurement for payment for the trench excavation, bedding backfill and compaction will be based upon per Construction Documents.
- B. Payment for the trench excavation, bedding backfill and compaction will be made at the unit bid prices per cubic yard (CY) named in the Bid Sheet under Item No. 0033, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.34 12-INCH PVC, CLASS 150 AWWA C900 (Bid Item No. 0034)**

- A. Measurement of payment for installing the 12-inch PVC, class 150 AWWA C900 will be based upon per Construction Documents.
- B. Payment for installing the 12-inch PVC, class 150 AWWA C900 will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0034, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.35 12-INCH x 8-INCH TEE (Bid Item No. 0035)**

- A. Measurement of payment for installing the 12-inch x 8-inch tee will be based upon per Construction Documents.
- B. Payment for installing the 12-inch x 8-inch tee will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0035, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.36 12-INCH GATE VALVE (Bid Item No. 0036)**

- A. Measurement of payment for installing the 12-inch gate valve will be based upon per Construction Documents.
- B. Payment for installing the 12-inch gate valve will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0036, which price shall constitute full compensation of all such work as required per the Contract Documents.



**2.37 8-INCH GATE VALVE (Bid Item No. 0037)**

- A. Measurement of payment for installing the 8-inch gate valve will be based upon per Construction Documents.
- B. Payment for installing the 8-inch gate valve will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0037, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.38 12-INCH x 8-INCH REDUCER (Bid Item No. 0038)**

- A. Measurement of payment for installing the 12-inch x 8-inch reducer will be based upon per Construction Documents.
- B. Payment for installing the 12-inch x 8-inch reducer will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0038, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.39 DI ADAPTER, MJ x MJ, 12-INCH (Bid Item No. 0039)**

- A. Measurement of payment for installing the DI adapter, mj x mj, 12-inch will be based upon per Construction Documents.
- B. Payment for installing the DI adapter, mj x mj, 12-inch will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0039, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.40 36-INCH HORIZONTAL BORING, CASING, 0.563-INCH WALL THICKNESS (Bid Item No. 0040)**

- A. Measurement of payment for installing the 36-inch horizontal boring, casing, 0.563-inch wall thickness will be based upon per Construction Documents.
- B. Payment for installing the 36-inch horizontal boring, casing, 0.563-inch wall thickness will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0040, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.41 24-INCH HORIZONTAL BORING, CASING, 0.375-INCH WALL THICKNESS (Bid Item No. 0041)**

- A. Measurement of payment for installing the 24-inch horizontal boring, casing, 0.375-inch wall thickness will be based upon per Construction Documents.
- B. Payment for installing the 24-inch horizontal boring, casing, 0.375-inch wall thickness will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item

No. 0040, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.42 VALLEY GUTTER (Bid Item No. 0042)**

- A. Measurement of payment for installing the valley gutter will be based upon per Construction Documents.
- B. Payment for installing the valley gutter will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0042, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.43 PREPARE AND ROLL SUB-BASE (ROAD) (Bid Item No. 0043)**

- A. Measurement of payment for preparing and rolling sub-base (road) will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for preparing and rolling sub-base (road) will be made at the unit bid prices per square yard (SY) named in the Bid Sheet under Item No. 0043, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.44 FILL, BORROW (ROAD) (Bid Item No. 0044)**

- A. Measurement for payment for the fill, borrow will be based upon per Construction Documents.
- B. Payment for the fill, borrow will be made at the unit bid prices per cubic yard (CY) named in the Bid Sheet under Item No. 0044, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.45 BASE COURSE, CRUSHED ¾-INCH CRUSHED STONE (ROAD) (Bid Item No. 0045)**

- A. Measurement of payment for the base course, crushed ¾-inch crushed stone will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for the base course, crushed ¾-inch crushed stone will be made at the unit bid prices per square yard (SY) named in the Bid Sheet under Item No. 0045, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.46 AC PAVING (Bid Item No. 0046)**

- A. Measurement for payment for the AC paving will be based upon per Construction Documents.

- B. Payment for the AC paving will be made at the unit bid prices per ton (Ton) named in the Bid Sheet under Item No. 0046, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.47 4-INCH THERMOPLASTIC STRIPING (Bid Item No. 0047)**

- A. Measurement of payment for installing the 4-inch thermoplastic striping will be based upon per Construction Documents.
- B. Payment for installing the 4-inch thermoplastic striping will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0047, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.48 8-INCH THERMOPLASTIC STRIPING (Bid Item No. 0048)**

- A. Measurement of payment for installing the 8-inch thermoplastic striping will be based upon per Construction Documents.
- B. Payment for installing the 8-inch thermoplastic striping will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0048, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.49 RAISED MARKERS – AMBER/AMBER (Bid Item No. 0049)**

- A. Measurement of payment for installing the raised markers – amber/amber will be based upon per Construction Documents.
- B. Payment for installing the raised markers – amber/amber will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0049, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.50 RAISED MARKERS – ONE WAY, REFLECTIVE (Bid Item No. 0050)**

- A. Measurement of payment for installing the raised markers – one way, reflective will be based upon per Construction Documents.
- B. Payment for installing the raised markers – one way, reflective will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0050, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.51 RAISED MARKERS – RED AND CLEAR (Bid Item No. 0051)**

- A. Measurement of payment for installing the raised markers – red and clear will be based upon per Construction Documents.

- B. Payment for installing the raised markers – red and clear will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0051, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.52 PAINT CURBING (Bid Item No. 0052)**

- A. Measurement of payment for installing the painting curbing will be based upon per Construction Documents.
- B. Payment for installing the painting curbing will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0052, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.53 72-INCH LETTERING (Bid Item No. 0053)**

- A. Measurement of payment for installing the 72-inch lettering will be based upon per Construction Documents.
- B. Payment for installing the 72-inch lettering will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0053, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.54 24-INCH x 24-INCH REFLECTORIZED STOP SIGNS W/POST (Bid Item No. 0054)**

- A. Measurement of payment for installing the 24-inch x 24-inch reflectorized stop signs w/post will be based upon per Construction Documents.
- B. Payment for installing the 24-inch x 24-inch reflectorized stop signs w/post will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0054, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.55 12-INCH x 18-INCH REFLECTORIZED GUIDE AND DIRECTIONAL SIGNS W/POST (Bid Item No. 0055)**

- A. Measurement of payment for installing the 12-inch x 18-inch reflectorized guide and directional signs w/post will be based upon per Construction Documents.
- B. Payment for installing the 12-inch x 18-inch reflectorized guide and directional signs w/post will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0055, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.56      24-INCH x 24-INCH REFLECTORIZED WARING SIGNS W/POST (Bid Item No. 0056)**

- A. Measurement of payment for installing the 24-inch x 24-inch reflectorized warning signs w/post will be based upon per Construction Documents.
- B. Payment for installing the 24-inch x 24-inch reflectorized warning signs w/post will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0056, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.57      6-FOOT HIGH, 4-FOOT WIDE, GALVINIZED SWING GATE (Bid Item No. 0057)**

- A. Measurement of payment for installing 6-foot high, 4-foot wide, galvanized swing gate will be based upon per Construction Documents.
- B. Payment for installing the 6-foot high, 4-foot wide, galvanized swing gate will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0057, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.58      6-FOOT HIGH, DOUBLE 22-FOOT WIDE, GALVINIZED SWING GATE (Bid Item No. 0058)**

- A. Measurement of payment for installing 6-foot high, double 22-foot wide, galvanized swing gate will be based upon per Construction Documents.
- B. Payment for installing the 6-foot high, double 22-foot wide, galvanized swing gate will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0058, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.59      6-FOOT HIGH CHAIN LINK FENCE (Bid Item No. 0059)**

- A. Measurement of payment for installing 6-foot high chain link fence will be based upon per Construction Documents.
- B. Payment for installing the 6-foot high chain link fence will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0059, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.60      GRAVITY WALL - CAST IN PLACE (Bid Item No. 0060)**

- A. Measurement of payment for installing gravity wall – cast in place, will be based upon per Construction Documents.

- B. Payment for installing the gravity wall – cast in place, will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0060, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.61 8-FOOT CAST IN PLACE RETAINING WALL (Bid Item No. 0061)**

- A. Measurement of payment for installing 8-foot cast in place retaining wall, will be based upon per Construction Documents.
- B. Payment for installing the 8-foot cast in place retaining wall, will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0061, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.62 FILL, BORROW (RAILROAD) (Bid Item No. 0062)**

- A. Measurement for payment for the fill, borrow will be based upon per Construction Documents.
- B. Payment for the fill, borrow will be made at the unit bid prices per cubic yard (CY) named in the Bid Sheet under Item No. 0062, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.63 BASE COURSE, CRUSHED ¾-INCH CRUSHED STONE (RAILROAD) (Bid Item No. 0063)**

- A. Measurement of payment for the base course, crushed ¾-inch crushed stone will be based upon complete removal/demolition per the Contract Documents.
- B. Payment for the base course, crushed ¾-inch crushed stone will be made at the unit bid prices per square yard (SY) named in the Bid Sheet under Item No. 0063, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.64 CONCRETE RR GRADE CROSSING (Bid Item No. 0064)**

- A. Measurement of payment for installing concrete RR grade crossing, will be based upon per Construction Documents.
- B. Payment for installing the concrete RR grade crossing, will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0064, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.65 WOOD RR GRADE CROSSING (Bid Item No. 0065)**

- A. Measurement of payment for installing wood RR grade crossing, will be based upon per Construction Documents.

- B. Payment for installing the wood RR grade crossing, will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0065, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.66 RR BALLAST, CRUSHED STONE (Bid Item No. 0066)**

- A. Measurement of payment for installing RR ballast, crushed stone, will be based upon per Construction Documents.
- B. Payment for installing the RR ballast, crushed stone, will be made at the unit bid prices per ton (Ton) named in the Bid Sheet under Item No. 0066, which price shall constitute full compensation of all such work as required per the Contract Documents.

**2.67 RR TIES, WOOD, PREESURE TREATED (Bid Item No. 0067)**

- A. Measurement of payment for installing RR ties, wood, pressure treated will be based upon per Construction Documents.
- B. Payment for installing the RR ties, wood, pressure treated, will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0067, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.68 132 LB PRIME RAIL (Bid Item No. 0068)**

- A. Measurement of payment for installing 132 lb prime rail will be based upon per Construction Documents.
- B. Payment for installing the 132 lb prime rail, will be made at the unit bid prices per track foot (TF) named in the Bid Sheet under Item No. 0068, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.69 DRIVEWAY CUT (Bid Item No. 0069)**

- A. Measurement of payment for installing driveway cut will be based upon per Construction Documents.
- B. Payment for installing the driveway cut, will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0069, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.70 CURB RAMP (Bid Item No. 0070)**

- A. Measurement of payment for installing curb ramps will be based upon per Construction Documents.

- B. Payment for installing the curb ramps, will be made at the unit bid prices per each (EA) named in the Bid Sheet under Item No. 0070, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.71 CONCRETE BRIDGE MODIFICATIONS (Bid Item No. 0071)**

- A. Measurement of payment for concrete bridge modifications will be based upon per Construction Documents.
- B. Payment for installing the concrete bridge modifications, will be made at the unit bid prices per ~~each (EA)~~ **square foot (SF)** named in the Bid Sheet under Item No. 0071, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.72 CONCRETE BRIDGE APPROACH (Bid Item No. 0072)**

- A. Measurement of payment for concrete bridge approach will be based upon per Construction Documents.
- B. Payment for installing the concrete bridge approach, will be made at the unit bid prices per ~~each (EA)~~ **square foot (SF)** named in the Bid Sheet under Item No. 0072, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.73 CONCRETE CURB AND GUTTER (INCLUDING BASE ROCK) (Bid Item No. 0073)**

- A. Measurement of payment for concrete curb and gutter will be based upon per Construction Documents.
- B. Payment for installing the concrete curb and gutter, will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0073, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.74 CONCRETE SIDEWALK (INCLUDING BASE ROCK) (Bid Item No. 0074)**

- A. Measurement of payment for concrete sidewalk will be based upon per Construction Documents.
- B. Payment for installing the concrete sidewalk, will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0074, which price shall constitute full compensation of all such work as required per the Contract Documents

**2.75 CONCRETE CURBING (Bid Item No. 0075)**

- A. *Measurement of payment for concrete curbing will be based upon installation per Construction Documents.*



- B. Payment for installing the concrete curbing will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0075, which shall constitute full compensation of all such work as required per the Contract Documents.**
- 2.76 GUARDRAIL ("K-RAIL") (Bid Item No. 0076)**
- A. Measurement of payment for Guard Rail ("K-rail" )will be based upon installation per Construction Documents.**
- B. Payment for installing the guard rail will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0076, which shall constitute full compensation of all such work as required per the Contract Documents.**
- 2.77 RAILROAD TURNOUT NO. 10, 136# (Bid Item No. 0077)**
- A. Measurement of payment for No. 10 turnout will be based upon per Construction Documents.**
- B. Payment for installing the No. 10 turnout will be made at the unit bid price per each (EA) named in the Bid Sheet under Item No. 0077, which price shall constitute full compensation of all such work as required per the Contract Documents.**
- 2.78 CONCRETE SIDEWALK (INCLUDING BASE ROCK) (Bid Item No. 0078)**
- A. Measurement of payment for a turnout relay for each No. 10 turnout will be based upon installation per Construction Documents.**
- B. Payment for installing the relay for each No. 10 turnout will be made at the unit bid price per each (EA) named in the Bid Sheet under Item No. 0077, which price shall constitute full compensation of all such work as required per the Contract Documents.**
- 2.79 8" PVC STORM DRAIN (Bid Item No. 0079)**
- A. Measurement of payment for installing the 8-inch PVC, SDR 26 storm drain will be based upon per construction documents.**
- B. Payment for installing the 8-inch PVC, SDR 26 will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0079, which price shall constitute full compensation of all such work as required per the Contract Documents.**
- 2.80 24" CMP STORM DRAIN (Bid Item No. 0080)**

- A. Measurement of payment for installing the 24-inch CMP storm drain will be based upon per construction documents.*
- B. Payment for installing the 24-inch CMP will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0080, which price shall constitute full compensation of all such work as required per the Contract Documents.*

**2.81 METAL BEAM GUARD RAIL (Bid Item No. 0081)**

- A. Measurement of payment for Metal Beam Guard Rail (Caltrans Standard Detail A77) will be based upon per Construction Documents.*
- B. Payment for installing the Metal Beam Guard Rail will be made at the unit bid prices per linear foot (LF) named in the Bid Sheet under Item No. 0081, which shall constitute full compensation of all such work as required per the Contract Documents.*

**BID OPTION**

**2.90 TEMPORARY TRACK (Bid Option Item No. 00082)**

- A. Measurement of payment for Bid Alternate – Temporary Track will be based upon per Construction Documents.*
- B. Payment for installing the Bid Alternate – Temporary Track will be made at the unit bid price per lump sum (LS) named in the Bid Sheet under Bid Alternate Item No. 00082, which price shall constitute full compensation of all such work as required per the Contract Documents.*

**END OF SECTION**

## SECTION 05650

## RAILROADS

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

- |          |   |
|----------|---|
| AREMA-01 | (2000) Manual for Railway Engineering and Maintenance-of-Way Association 4 Vol., Volume 1 |
| AREMA-02 | (1996) 1996-1997 Portfolio of Track Work Plans  |

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- |            |   |
|------------|---|
| ASTM C 88  | (1990) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate  |
| ASTM C 117 | (1995) Materials Finer Than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing  |
| ASTM C 127 | (1988; R 1993) Specific Gravity and Absorption of Coarse Aggregate  |
| ASTM C 131 | (1996) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine   |
| ASTM C 136 | (1984a) Sieve Analysis of Fine and Coarse Aggregates<br><br>(1993) Sieve Analysis of Fine and Coarse Aggregates<br><br>(1995a) Sieve Analysis of Fine and Coarse Aggregates |
| ASTM C 142 | (1978; R 1990) Clay Lumps and Friable Particles in Aggregates   |
| ASTM C 535 | (1996) Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine   |
| ASTM C 702 | (1993) Reducing Samples of Aggregate to Testing Size  |

ASTM D 75	(1987; R 1992) Sampling Aggregates
ASTM D 217	(1994) Cone Penetration of Lubricating Grease (IP50/88)
ASTM D 402	(1994) Distillation of Cut-Back Asphaltic (Bituminous) Products
ASTM D 445	(1996) Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity)
ASTM D 566	(1993) Dropping Point of Lubricating Grease
ASTM D 1310	(1986; R 1997) Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
ASTM D 2171	(1994) Viscosity of Asphalts by Vacuum Capillary Viscometer
ASTM D 4791	(1995) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM E 11	(1995) Wire-Cloth Sieves for Testing Purposes

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(1996) Structural Welding Code - Steel
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## AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C6	(1995) Cross Ties and Switch Ties Preservative Treatment by Pressure Processes
AWPA M2	(1995) Standard for Inspection of Treated Timber Products
AWPA M6	(1995) Brands Used on Forest Products
AWPA P2	(1995) Standard for Creosote Solutions

## FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA SA-89-006	(1988) Manual on Uniform Traffic Control Devices for Streets and Highways
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## NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA TC 6	(1999) PVC Plastic Utilities Ducts for Underground Installations
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## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(1999) National Electric Code (NEC)
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## UNDERWRITERS LABORATORY (UL)

UL 651 (1998) Schedule 40 and 80 Rigid PVC Conduit

## U.S. ARMY CORPS OF ENGINEERS (US ACE)

EM 385-1-1 (1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-01 Data

Wood Ties; FIO.

Name of the tie manufacturer, Rail Tie Association membership, the wood species proposed, the quantities of ties for each specie proposed, and product data for the ties to be furnished, including the type of seasoning to be utilized, prior to ordering the ties

New Jointed Rail; GA. Relay Rail; GA. Joint Bars; FIO. Compromise Joint Bars; FIO.

Manufacturer's data on new rail including: rail weight, rail section, drilling, rail length, date rolled, and the name of the mill where the rail was rolled. For relay rail the required information shall include weight, section, lengths, and the name of the supplier. The maximum allowable vertical wear on the rail head and the maximum allowable horizontal wear on the side of the rail shall be provided. The design of the joint bars and compromise joint bars proposed to be furnished with each rail section shall also be provided.

Miscellaneous Track Materials; FIO.

Manufacturer's data for all track materials to be furnished.

Crossing Material or Surface; FIO.

Within 30 days of the Notice to Proceed, the brand name of the premanufactured crossing material or crossing surface material proposed for use along with manufacturer's literature concerning the product; and for built-in-place crossings, the type of materials to be used along with manufacturer's literature.

Components or Products; GA.

Performance data for components or products proposed as an equivalent to those specified. The Contracting Officer's written approval is required for any such equivalent type component or product proposed to be used.

## SD-04 Drawings

As-Built; GA.

One set of reproducible originals of the final as-built drawings for each automatic crossing protection installation prior to final acceptance by the Contracting Officer. The materials and methods used to produce these drawings shall meet the requirements of this specification and shall result in drawings which are easy to revise without damage to the drawing.

#### SD-07 Schedules

Materials and Equipment; F10.

A complete schedule of the materials proposed for installation within 60 days of receipt of notice to proceed, and before installation of the materials; the schedule shall include a list of equipment proposed for the work.

#### SD-08 Statements

Traffic Maintenance and Detour Plans; GA.

Traffic maintenance and detour plans for approval.

Crossing Material or Surface; F10.

Detailed installation procedure for the premanufactured crossing material or crossing surface material proposed for use within 30 days of the notice to proceed.

Thermite Welding Procedures; GA.

A detailed statement covering the step-by-step procedures to be employed in making the welds, including a complete description of each of the following items, as applicable, and any other essential characteristics included in the welding procedures:

- a. The manufacturer's trade name for the welding process.
- b. The method used for cutting and cleaning the rail ends. Flame cutting of rail ends will not be allowed.
- c. The minimum and maximum spacing between rail ends.
- d. The method used for maintaining the rails in alignment during welding.
- e. The method used for preheating, including time and temperature.
- f. The tapping procedure, including the minimum time required to cool the weld under the mold insulation.
- g. The method used, including a description of special tools and equipment, for removing the upset metal and finishing the weld to the final contour.
- h. Quality control procedures to be followed.
- i. The contractual agreements with any subcontractor employed by the Contractor in doing the work.

Electric Arc Welding; FIO.

A detailed specification covering the step-by-step procedures to be employed in making the electric arc welds. A complete description of each of the following items as applicable and any other essential characteristics shall be included in the procedure specifications.

- a. Type, size, and capacity of electric welding machine (250 amp minimum), grinder and other equipment. Also, type and size of material (welding rod or wire).
- b. The method to be used to remove defective and excess metal prior to welding (arcair or grinding).
- c. The method to be used to prevent warping.
- d. The method used for preheating, including time and temperature.
- e. The method of applying metal buildup and slag removal.
- f. The method of securing original contour of items welded.
- g. Quality control procedures to be followed.
- h. Welding materials (rod or wire), name and manufacturer of materials (low carbon steel) for welding rail, rail frogs, guard rails, switch point protectors, and switch points without manganese inserts and materials (manganese alloy) for welding manganese frogs, RBM frogs, manganese switch point inserts and manganese railroad crossing inserts or castings.

SD-09 Reports

Sampling and Testing; GA.

One certified copy of Test Reports for each test performed on the ballast within 2 working days of the test completion.

Wood Ties; FIO.

Certified test reports for cross ties and switch ties subsequent to treatment, a minimum of seven calendar days prior to any ties being installed in track. Test reports shall contain the information required by Part 7 of AWPA M2.

Geotextiles; F10.

Independent testing laboratory's certified test reports for geotextiles, including necessary analysis and interpretation. These reports shall provide results of the laboratory testing performed on samples of the geotextile material delivered to the jobsite. Test reports shall be submitted at least 5 working days prior to the installation of the geotextile.

Ultrasonic Test; FIO.

Results of the ultrasonic rail testing. Results shall list defects and rail stationing.

## SD-13 Certificates

Wood Ties; FIO.

Certificates of compliance prior to any ties being installed in track.

Ballast

Certificates of Compliance for the ballast and subballast materials to be installed in this project. Subballast shall conform to the requirement of aggregate base per Section 02300, "Earthwork".

Materials and Equipment

Manufacturer's certificates of conformance for the following materials:

- a. Rail.
- b. Tie plates.
- c. Track bolts, nuts, and spring washers.
- d. Joint bars.
- e. Rail anchors.
- f. Track spikes.
- g. Turnouts.
- h. Premanufactured road crossings and/or crossing surfaces.
- i. Rail welding process.

## SD-14 Samples

Ballast Samples

The Contractor shall collect and test samples of material being proposed for ballast. Test results shall be submitted a minimum of 30 days prior to the installation of the material. A Contracting Officer's representative shall be present at the source site during the gathering of samples. Samples shall be obtained from the quarry, supplier, or other source that will be used to provide the ballast materials for this project using the methods described in ASTM D 75. One representative sample of not less than 200 lbs of ballast material shall be submitted for each 10,000 ton of ballast to be installed. It is the Contractor's responsibility to perform the necessary quality control test to assure compliance with the specifications.

## SD-18 Records

Record of Field Weld; FIO.

A welding record of each field weld on the form attached at the end of this section. The original copies of the form bearing the signatures and initials of personnel involved shall be submitted as part of the Project Record Documents.

Table VII; FIO.

A record of the items repaired or rebuilt by the electric arc welding method and grinding as shown on Table VII at the end of this section.

## 1.3 DELIVERY, STORAGE, AND HANDLING

## 1.3.1 Materials and Samples



The Contracting Officer will notify the Contractor of the materials approved or disapproved. Disapproved materials that have already been delivered to the project site, shall be promptly segregated from the approved materials and removed from the premises. If materials are disapproved, acceptable replacement materials shall be provided at no additional cost to the Government. Initial approval by the Contracting Officer will not prevent the removal and replacement of materials that are materially defective or materials not meeting this specification that are discovered during construction and/or routine quality control/quality assurance operations.

#### 1.3.2 Geotextiles

Geotextiles shall be shipped and stored in their original ultraviolet resistant cover until the day of installation. Geotextiles shall be protected from vandalism, temperatures greater than 140 degrees F, dirt, dust, mud, debris, moisture, sunlight, and ultraviolet rays. Geotextiles delivered to the project site shall be clearly labeled on the material cover to show the manufacturer's name, brand name, fabric type, location and date manufactured, lot identification, width, and length.

#### 1.4 QUALIFICATIONS

##### 1.4.1 Track Construction

Track construction shall be performed under the direction of qualified and competent supervisory personnel experienced in railroad construction.

##### 1.4.2 Welding

Welding shall be performed under the direct supervision of an experienced welding supervisor or foreman.

#### 1.5 PROJECT/SITE CONDITIONS

##### 1.5.1 Temporary Work

During construction, suitable roads and crossings with all necessary lights, signs, drainage, and other appurtenances required for safe public and local travel shall be provided. Suitable temporary fences shall be erected and maintained where required to prevent trespass upon work or damage to adjoining property. Drainage shall be maintained, and the accumulation of water that might affect the stability of the roadbed will not be permitted. Safety fences shall have signs posted with specific wording: DANGER, CONSTRUCTION AREA, KEEP OUT. Reference EM-385-1-1, Section 04.A.04 b.

##### 1.5.2 Traffic Control

Traffic control devices shall comply with FHWA SA-89-006. Suitable warning signs shall be placed near the beginning of the work site and well ahead of the work site for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

### 1.5.3 Welding

Welding shall not be performed in rain, snow, or other inclement weather without adequately protecting the weld from the elements.

## PART 2 PRODUCTS

### 2.1 BALLAST

Prepared ballast shall be crushed stone, Size No. 4A, conforming to Chapter 1, Part 2, of AREMA-01 for quality, soundness and gradation. In the portion retained on each sieve specified, the crushed rock shall contain at least 90 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the plane. When two fractures are contiguous, the angle between planes of the fractures shall be at least 30 degrees in order to count as two fractured faces. Ballast materials shall meet the property requirements shown in TABLE 2.1, "Recommended Limiting Values of Testing for Ballast Material" of Chapter 1, Part 2 of AREMA-01.

### 2.2 JOINT BARS

Joint bars shall be of the size, shape, and punching pattern to fit the rail being joined.

#### 2.2.1 New Joint Bars

New joint bars shall be used with new rail, and shall be of the "toeless" and head to match rail section. New joint bars shall conform to the requirements of "Specifications For High-Carbon Steel Joint Bars" or "Specifications For Quenched Carbon-Steel Joint Bars and Forged Compromise Joint Bars" found in Chapter 4, Part 2 of AREMA-01 for the joint bar and assemblies recommended in Chapter 4, Part 1 of AREMA-01.

#### 2.2.2 Used Joint Bars

Used joint bars in good condition shall be used with relay rail only. The type of joint bar can be either "toeless" or "long toe". The used "long toe" type of joint bar shall not be employed where, because of the tie plate punching pattern, the spike slots are used to spike the rail to alignment at the joints. Used joint bars shall be straight, free from cracks, breaks, and other visual defects. Excessive rust, dirt, and other foreign materials on the joint bars are not permitted. Used joint bars shall be of the proper size to make good contact with the underside of the rail head and the top of the rail base on the rails being joined. Joint bars shall have alternating round and oval bolt holes. Bolt holes shall not show excessive wear that would prevent use of the oval neck track bolt normally used with that joint bar. Joint bars that have been flame-gouged, flame cut, or otherwise altered shall be considered scrap and shall not be used.

#### 2.2.3 Compromise Joint Bars

Compromise joint bars shall be of the size, shape, and punching pattern to fit the rail sizes and sections being joined. Only factory designed and constructed (forged or cast) compromise joint bars shall be used to join rails of different sizes.

## 2.2.3.1 New Compromise Joint Bars

Compromise joint bars shall conform to the requirements of "Specifications For Quenched Carbon-Steel Joint Bars and Forged Compromise Joint Bars" found in Chapter 4, Part 2 of AREMA-01.

## 2.2.3.2 Used Compromise Joint Bars

Requirements for joint bars in paragraph Used Joint Bars shall also apply to used compromise joint bars.

## 2.3 GREASE

Grease for lubricating moving parts in turnouts and other trackwork shall have the following typical characteristics:

Calcium Soap, percent	9.0
Solid Additive (Graphite), percent	11.5
Penetration, ASTM D 217 at 77 degrees F worked	340
Dropping Point ASTM D 566 at 77 degrees F	101/214
Oil Viscosity, cSt at 104 degrees F	81.8
ASTM D 445 SUS at 100 degrees F	379

Other types of grease or lubricating oil may be used provided that the grease or oil has been used successfully by local commercial railroads and has the approval of the Contracting Officer.

## 2.4 OIL FOR CORROSION PROTECTION

Oil for protecting rail and other track materials from corrosion, except joints, shall conform to the following general specification:

Asphalt, 100 penetration minimum 45 percent	ASTM D 402
Flash point, minimum 130 degrees F	ASTM D 1310
Viscosity, kinematic, 140 degrees F 480 to 700 centistokes	ASTM D 2171

## 2.5 RAIL

## 2.5.1 New and Relocated Mainline Track

***All mainline track, including the mainline turnout near engineering station 230+00, shall be new standard hardness 136 RE continuous welded rail (CWR).***

New rail shall conform to the requirements of AREMA Chapter 4, Part 2.1, Specification for Steel Rails. The new turnout near engineering station 613+00 shall use new standard hardness 136 RE rail or better. Used and/or new industrial grade rail shall not be used.

## 2.5.2 New and Relocated Siding and Industry Track

Where possible, all removed and salvaged rail and tie plates from the existing mainline that is reusable shall be installed on new and relocated siding and industry track. The majority of existing rail that will be

removed from the mainline is 113 HF and 119 RE with some minor 112 RE, with a combination of both **CWR** and jointed rail.

## 2.6 TIE PLATES

### 2.6.1 General

AREMA 14-inch tie plate for 6-inch rail base width, Plan No. 12.

### 2.6.2 Used Tie Plates

Used tie plates shall be free from excessive rust, pitting, mechanical damage, and dirt and other foreign materials. Cracked or broken plates shall be considered as scrap and shall not be used. Shoulders on the tie plates shall project a minimum of 1/4 in. above the plane of the rail seat. The thickness of the tie plate shall be at least 1/2 in. when measured anywhere in the rail seat area. Spike holes shall be square and not corroded, worn, or mechanically enlarged. Existing tie plates may be used if the existing tie plate conform to the provisions of this Section.

## 2.7 WOOD TIES

Species shall be Red and White Oak, or Douglas Fir. Switch ties shall be Oak. Conditioning and seasoning shall conform to the requirements of AWPA C6 for the individual wood species. Ties shall be well seasoned. Prior to preservative treatment, wood ties shall be dried to the oven dry moisture content, or less, as specified in paragraph 3.14 of AWPA C6. The wood may be air dried, vapor dried, or boultonized. Ties which are to be dried by artificial means shall be conditioned and treated as soon as possible after sawing, but no more than 30 days later. The temperature used for boultonizing shall be as high as possible but in no case less than 200 degrees F. Vapor dried ties shall be transferred from drying cylinders to treatment cylinders as quickly as possible to avoid loss of heat from the seasoned ties. Ties shall be pressure treated in accordance with Chapter 30, Part 6 of AREMA-01 by the empty cell process with a 60/40 creosote/coal tar solution (Grade C) in accordance with AWPA P2 to a minimum retention of 8 lbs/cu ft of wood. The Contractor shall record treatment as specified in AWPA M2. Treated ties shall be permanently marked or branded by the producer in accordance with AWPA M6. Ties shall be produced by a member of the Railway Tie Association. All ties, except Red and oak shall be incised on all four sides in the pattern specified in AREMA-01, Chapter 30, Part 6, prior to treatment. Splits shall not be longer than 4 in. and not wider than 1/4 in. at either end. Splits longer than 4 in. but not longer than the width of the face in which the split appears, will be acceptable if specified anti-splitting devices are installed with the splits compressed. Any required adzing and drilling for spikes shall be performed prior to treatment. The Contractor's Quality Control organization is responsible for certifying that all shipped wood products meet specifications. The Contractor shall notify the Contracting Officer at least 15 days prior to the shipment of any treated ties or timbers from the manufacturer's plant, to provide the Government the opportunity to inspect the materials before shipment. When inspections of onsite materials result in product rejection, the Contractor shall promptly segregate and remove rejected material from the premises. The Government may also charge the Contractor any additional cost of inspection or test when prior rejection makes reinspection or retesting necessary.

Contractor may use ties salvaged for reuse per Section 02120.

### 2.7.1 Crossties

Wood crossties shall conform to Chapter 30, Part 1 of AREMA-01.

- a. Wood crossties except at road crossings: Wood ties shall be sawed and shall be not less than 7 in. thick and 9 in. wide.
- b. Wood crossties at road crossings: The length shall be 10 ft, unless recommended otherwise by the manufacturer of crossing surface materials. Five (5) 10-foot transition ties shall be placed at both ends of grade crossing, per Union Pacific Standard Drawing 0304D

### 2.7.2 Switch Ties

Switch ties shall conform to Chapter 30, Part 2 of AREMA-01 and shall be sawed 7 in. thick and 9 in. wide. The length and quantities shall be as shown.

### 2.7.3 Ballasted-Deck Bridge Ties

Ties for use in track over ballasted deck bridges shall be standard crossties.

### 2.7.4 Tie Plugs

Tie plugs shall fit holes from which spikes are drawn. The plugs shall comply with Chapter 30, Part 1 of AREMA-01 and shall be treated in accordance with Chapter 30, Part 6 of AREMA-01.

## 2.8 ANTI-SPLITTING DEVICES

Crossties and switch ties shall be equipped with anti-splitting devices of the type specified, regardless of whether or not the wood has shown any tendency to split. Products used shall conform to Chapter 30, Part 1 of AREMA-01. Anti-splitting devices shall be applied in accordance with Chapter 30, Part 1, Section 10 of AREMA-01. Crossties shall be equipped on each end with gang nails (nail end plates). Switch ties shall be equipped with gang nails.

## 2.9 TURNOUTS AND TRACK CROSSOVER

The component parts of the turnout (Reference UP Std. 5020, 1C) to be furnished shall be the products of manufacturers regularly engaged in the manufacture of such products, and shall essentially duplicate items that have been in satisfactory use at least 2 years prior to bid opening. The parts need not all be made by the same manufacturer, but each turnout shall be the product of a single firm. Switch assemblies, stands, frogs, and frog guardrail assemblies shall conform to the requirements of AREMA-02. Wood ties for turnout shall be new and installed per UP Standards.

### 2.9.1 Rail and Joint Bars

Rail, joint bars, and miscellaneous track materials used in turnout and track crossing construction shall be furnished and installed as part of the complete turnout or crossing. Rail and miscellaneous track materials used in turnout and track crossing construction shall be the weight and section as listed:

TURNOUT TRACK OR CROSSOVER ID	SIZE	RAIL	DRILLING
1	10	136RE	_____
2	10	136RE	

### 2.9.2 Maximum Wear on Used Rails Installed in Turnouts

The average top (vertical) wear shall be 1/8 in. or less of new rail of the same specification. Gage side head wear shall not exceed 1/8 in. of new rail of the same specification.

### 2.9.3 Frogs, Switches, Frog Guardrails and Appurtenances

Frogs, switches, frog guardrails and appurtenances shall be new or rebuilt materials suitable for use in heavy tonnage main track. Used turnout materials shall have been fully reconditioned and shall be within plus or minus 1/8 in. of the original specification for that turnout design. Materials used in the turnout shall be of the same weight and section. Materials shall be in good condition and free from excessive rust, dirt, and other foreign materials. The rail weight and section shall be as specified.

#### 2.9.3.1 Switches

Switches for new turnout construction or complete turnout replacement shall be 16 and 6 in. reinforced straight split switches with manganese steel tips and graduated risers generally conforming to AREMA-02 Plan Number 112. Switch materials used to replace defective materials shall be as indicated.

- a. Switch points shall be new. Switch point detail shall be AREMA-02 Plan No. 221, Detail 4000 or 6100.
- b. Switch rods and connecting rods shall be new.
- c. Gage plates, switch plates, slide plates, and heel plates shall either be new or used and in good condition and not worn or corroded. Rail braces shall be either rigid or adjustable. For a given turnout all rail braces shall be of the same design.
- d. Heel blocks shall be either cast or forged steel and be either new or used and in good condition. New heel block bolt assemblies shall be provided and shall be heat treated. The heel joint bars shall be either new or used in good condition and manufactured for the purpose.

#### 2.9.3.2 Frogs

Frogs shall be solid manganese self-guarded in the sizes indicated.

- a. Frogs shall be new or remanufactured. Cracked or broken used frog castings shall not be used. Cracked or broken frog castings that have been repaired by welding are not acceptable and shall not be used. Remanufactured frogs shall meet the following wear requirements:

(1) Frog points shall be in good condition and not be worn,

chipped, or broken.

(2) Maximum allowable wear on used or reconditioned frogs shall be:

Frog Point:	1/8 in.
Top Surface:	1/8 in.
Raised Guarding Face (Self-Guarded)	1/8 in.
All Wear Surfaces	1/8 in.

(3) Minimum flangeway depth for used frogs shall be 1-3/4 in.  
Minimum flangeway width shall be 1-7/8 in.

b. Frog bolts, nuts, lock washers, and headlocks shall all be new.

#### 2.9.3.3 New or Replacement Frog Guard Rails

New or replacement frog guard rails shall be a minimum of 11 ft in length and shall be new or used in good condition. Frog guard rails shall be tee rail per AREMA-02 Plan No. 504. For used frog guard rails the guard face shall be smooth and not worn more than 1/8 in. from its new condition. Frog guard rails bolted to the running rails shall be equipped with fillers. When fillers are installed or repaired new bolt assemblies shall be used. All bolts, nuts, and associated hardware shall be new. Clamped frog guard rails shall be equipped with block wedges, filler wedges, and cotter keys. Frog guard rail plates shall be new or acceptable replacements. Single-shoulder tie plates used with frog guard rails shall be installed with the shoulder on the inside flush against the base of the frog guard rail.

#### 2.9.3.4 Hook Plates

Hook plates shall be new or acceptable used material and shall be of the designs and lengths indicated on AREMA-02 Plan Nos. 112 and 241.

#### 2.9.3.5 Switch Stands

- a. New or replacement switch stands shall conform to AREMA-02, Plan 251-64 and shall be new or fully reconditioned, low-stand type.
- b. Existing switch stands, staffs and targets, where not designated for replacement, shall be reconditioned by cleaning to bare metal and then painted with one coat of metal primer. The switch stand staff shall be painted with two coats of black enamel paint. Switch targets shall be similarly prepared and painted with two coats of red or white enamel paint to indicate switch position in accordance with normal railroad practice.
- c. Each stand shall be equipped with one of the following switch lamps as indicated on the project plans:
  - (1) Reflecting Type: Approved reflecting switch lamps fitted with standard commercial-type double red and white reflecting lenses but without day signal targets.
  - (2) Reflecting Type with Daylight Disk: Approved reflecting switch lamps fitted with standard commercial-type double red and white reflecting lenses, and with day signal targets.
  - (3) Illuminated Type: Approved illuminated lamps with primary

battery, battery housing, and cable.

#### 2.9.4 Road Crossings

Road crossings shall be new and shall be fabricated in accordance with Union Pacific Standards, as shown on Plans.

#### 2.9.5 Rail Braces

Rail braces shall be adjustable type, of standard manufacture, and conform to Union Pacific Standard Drawing 0485B.

### 2.10 GRADE CROSSINGS

#### 2.10.1 Crossing Material or Surface

Roadway width shall be as indicated in the contract drawings. Crossing material or surface shall comply with the following:

- a. Full-depth timber crossings shall be constructed-in-place. Timber road crossing materials shall be oak. Seasoning and treatment shall conform to the requirements of AWPAC6 and paragraph WOOD TIES.
- b. Premanufactured, precast concrete panels for grade crossings shall be constructed of reinforced concrete having a minimum 28 day compressive strength of 5,000 psi. Precast crossing panels shall be the product of a company regularly engaged in the manufacture of such panels, and whose products have been successfully used in the commercial railroad industry for at least 2 years.

#### 2.10.2 Rail

Rail within the road crossing and for at least 20 ft on either side of the crossing shall be 136RE as specified in paragraph Rail and Joint Bars.

#### 2.10.3 Ties

Ties within the road crossing and for at least 20 ft on either side of the crossing shall be hardwood and shall be as specified in paragraphs Crossties and Switch Ties.

#### 2.10.4 Track Materials

For premanufactured crossing surfaces or systems, tie plates, spikes or other rail fasteners, rail anchors, and other track materials shall conform to the manufacturer's recommendations. Unless specified by the crossing manufacturer, track materials shall be as specified in paragraph MISCELLANEOUS TRACK MATERIALS.

#### 2.10.5 Threaded Fasteners and Screw Spikes

Threaded fasteners for use in grade crossings shall be of the sizes and lengths specified by the grade crossing manufacturer or as indicated for built-in-place crossings. Screw spikes shall have a minimum ultimate tensile strength of 60,000 psi and shall be galvanized for corrosion protection.

#### 2.10.6 Pipe for Subdrains



Pipe for subdrains shall be the size shown on the drawings, corrugated, perforated metal pipe complying with AASHTO M 36/M 36M

#### 2.10.7 Cable Conduit

##### 2.10.7.1 Concrete Encased

UL 651 Schedule 40 or NEMA TC6 Type EB

##### 2.10.7.2 Direct Burial

UL 651 Schedule 40 or NEMA TC 6 Type DB

#### 2.10.8 Low-Voltage Cables

Cables shall be rated 600 volts and shall conform to the requirements of NFPA 70 and must be UL listed.

##### 2.10.8.1 Conductor Material

Underground cables shall be annealed copper complying with ASTM B 3 and ASTM B 8. Aluminum conductors are not permitted.

##### 2.10.8.2 Insulation

Insulation must be in accordance with NFPA 70, type RHW, XHHW or as indicated on the drawings.

##### 2.10.8.3 Conductor Material

Underground cables shall be annealed copper complying with ASTM B 3 and ASTM B 8. Aluminum conductors are not permitted.

#### 2.11 MISCELLANEOUS TRACK MATERIALS

Miscellaneous track materials shall be as follows:

##### 2.11.1 Spikes

###### 2.11.1.1 Track Spikes

Track spikes shall be new and shall conform to Chapter 5, Part 2 of AREMA-01 Track spikes size 6 by 5/8 in. shall be used with 100 lbs or heavier rail.

##### 2.11.2 Bolts, Nuts, and Spring Washers

New track bolts, nuts, and spring washers shall be used throughout the project for both new and relay rail. Bolts shall be used in both steel and timber bridge connections.

###### 2.11.2.1 Bolts and Nuts

The various rail, joint bars, and rail drillings require various lengths and diameters of bolt assemblies. The Contractor shall determine the number of bolt assemblies of each size required. All bolt diameters shall be the largest possible for a given rail drilling and joint bar punching. Bolts shall be the proper length for the joint bar to allow at least one full bolt thread to extend past the outside of the nut. Track bolts and

nuts shall conform to Chapter 4, Part 2 of AREMA-01. Track bolts shall be long enough to leave at least two threads exposed after the nut is tightened.

#### 2.11.2.2 Spring Washers

Spring washers and nuts shall be sized to ensure that the spring washer develops its full reactive force and does not jam into the joint bar hole. Spring washers shall be of the size to fit the bolt and nut used and shall conform to Chapter 4, Part 2 of AREMA-01, and Section M12 of AREMA-02.

#### 2.11.3 Rail Anchors

Where special tools are required to install or remove anchors, the Contractor shall furnish a minimum of one tool for each 5,000 anchors, or fraction thereof, not to exceed 5 tools per job.

##### 2.11.3.1 New Installation

Rail anchors for new installations shall be new True Temper Channeloc. Sizes shall conform to the various sizes of rail on the project and conform to "Specifications for Rail Anchors" in Chapter 5, Part 7 of AREMA-01. Anchors may be either drive-on or spring type.

##### 2.11.3.2 Salvaged Rail Anchors

Rail anchors salvaged from the track being removed shall become the property of the Contractor and shall be removed from the site. No used anchors shall be reinstalled unless they have been repinched.

#### 2.11.4 Insulated Joints

Insulated joints shall conform to Chapter 4, Part 2, Section 2.11 of AREMA-01. Conventional continuous insulated joints with fibre insulation shall not be used.

#### 2.11.5 Inner Guard Rail

Inner guard rail shall be Class IV or better used rails as indicated in Part 2, Chapter 4, "Inspection Classification of Second Hand Rail for Welding", of AREMA-01. Rail shall be 80 lbs or greater. All rails used at any one inner guard rail location shall be the same weight and section. Joint bars shall match the rail provided and shall be in good condition.

#### 2.11.6 Gage Rods

##### 2.11.6.1 New Gage Rods

New gage rods shall be the double-clamp style manufactured in conformance with "Specifications for Special Trackwork" of AREMA-01. The double clamp style gage rods shall be threaded on both ends and shall be equipped with four malleable steel casting clamps to rigidly hold both sides of the base of both rails.

##### 2.11.6.2 Used Gage Rods

Used gage rods shall not be furnished by the Contractor. Used gage rods shall be salvaged from existing track. Salvaged gage rods shall be cleaned and inspected prior to reinstallation. Bent or broken gage rods shall be

scrapped.

## 2.12 SALVAGED MATERIALS

### 2.12.1 Dunnage

Pallets, sills, and other material used for packaging and stacking salvaged track items shall be clean, free of decay or other defect, and sufficiently sturdy for the service intended.

### 2.12.2 Marking Paint

Marking paint shall be a good quality oil-based spray marking paint or a good quality oil-based paint marker.

### 2.12.3 Salvaging Rail

Existing rail marked for removal shall be Contractor's salvage. Salvaged rail is subject to the following:

- a. Nondefective and reclaimable 130 lb rails salvaged from existing tracks may be reused where the plans indicate new 136 lb rail, subject to review and approval of the materials by the Contracting Officer.
- b. Reclaimable defective rails may be used to construct inner guard rails provided all defects can be cropped off. Detailed inspection shall be made of such rails to ensure that rails which contain critical defects such as transverse defects, head-web separations, vertical split heads, pipe, split webs, etc., are not incorporated in the work. Loose rails located along the right-of-way shall be inspected and used as directed.
- c. Salvaged rail, ties, hardware, and OTM shall be placed near existing siding at a location approved by the Contracting Officer.

### 2.12.4 Joint Bars

Nondefective joint bars salvaged from existing tracks may be used to execute spot replacement work at other locations of the project, subject to review and approval of the material by the Contracting Officer.

### 2.12.5 Tie Plates

Tie plates salvaged from existing tracks, which are not either broken, cracked, or severely corroded or worn, may be used to execute the work subject to review and approval of the material by the Contracting Officer.

## 2.13 RAIL BONDING AND GROUNDING

### 2.13.1 Rail Bonds

Rail bonds shall be exothermic type ("Cadweld") bonds applied to the field side of the rail head, and use 46 in. duplex bonds welded to the rail web. For signals, the bond cables shall be flexible bare copper stranded 1/0 AWG cables with preformed ends. For static electricity bonding, bond cables shall be flexible bare copper stranded cables with preformed ends and shall conform to applicable requirements of AREMA-01.

### 2.13.2 Grounding Rods

Grounding shall conform to Chapter 12, Part 5 of AREMA-01.

### 2.13.3 Ground Connection Cables

Connections between the grounding system or ground rods and rails shall be made with a bare flexible copper stranded 2/0 AWG cable.

### 2.13.4 Electrical Connecting Hardware

Electrical connecting hardware shall be bronze pressure bar type materials having no rotating parts coming in direct contact with conductors.

## 2.14 WELDING

### 2.14.1 Rail Welding Kits

Kits for thermite type rail welds shall be approved by the Contracting Officer before use.

### 2.14.2 Rail

Rail for welding includes Contractor furnished material. The Contractor shall provide welding kits for all rail sections used and no differentiation will be made between contractor-furnished and government-furnished rail sections for measurement and payment purposes.

### 2.14.3 Metal Work Fabrication, Machine Work, and Miscellaneous Provisions

Welding rod Material Safety Data Sheets shall be reviewed for their particular toxicity with the MSPS kept on site. EM 385-1-1, Section 10B, shall be applied as required.

## 2.15 PERSONAL FLOTATION DEVICES

Personal flotation devices, boats, skiffs, floating plant, on-water work platforms shall comply with Section 5 of EM 385-1-1.

## 2.16 PERSONAL PROTECTIVE EQUIPMENT

Personal handling or working in the vicinity of coal tar-(creosote-)treated piles, bottom debris, dredge material, shall be afforded appropriate NIOSH-approved personal protective equipment during these exposures (i.e., gloves). If personnel are to cut creosote-treated timber, appropriate NIOSH-approved respirators are required.

## 2.17 CRANES

The Contractor (including subcontractors) shall have cage boom guards, insulating links, or proximity warning devices on cranes that will be working adjacent to power lines. These devices shall not alter the requirements of any other regulation of this part--even if law or other regulation requires such device. Insulating links shall be capable of withstanding a 1-minute dry low frequency dielectric test of 50,000 volts, alternating current (EM 385-1-1, Section 11.E.07). Calibration records or stamped date of required manufacturer inspection of proximity warning devices shall be kept on the crane. Additionally, prior to any work commencing, an Activity Hazard Analysis (EM 385-1-1, Fig.1-1) identifying

and satisfying EM 385-1-1 Section 11.A.02, 11.E.03, 11.E.04 and 11.E.05 requirements shall be submitted and accepted by the Contracting Officer.

## 2.18 HAZARDOUS ENERGY PROTECTION

The Contractor shall develop, implement, and maintain at the work place, a written Control of Hazardous Energy (lockout/tagout) System. Refer to Section 12 of EM 385-1-1.

## PART 3 EXECUTION

### 3.1 REMOVAL, SALVAGE, AND DISPOSITION OF MATERIALS

Tracks and segments of track shall not be dismantled until approved to do by the Contracting Officer. The following materials shall be salvaged by the Contractor for later use by the Government. Some of these items will be used in the installation of tracks as indicated.

#### 3.1.1 Methods and Procedures

The Contractor may use any methods to dismantle the track, provided proper measures are taken to ensure the safety of the laborers and the general public, and no damage is caused to track components to be salvaged or other tracks and structures which are indicated to remain. Methods of removal of existing tracks shall not cause damage to adjacent sidewalks or paved roadways. Damage to these facilities caused by the Contractor shall be restored at Contractor's expense.

#### 3.1.2 Inventory of Track Materials

The Contractor shall keep a detailed inventory of excess and salvaged track materials stockpiled for the Government. Detailed inventory shall be recorded in appropriate format and furnished to the Contracting Officer.

#### 3.1.3 Inspection and Reconditioning of Used Track Materials

Salvaged track materials shall be cleaned and inspected for defects to determine their suitability for further use.

##### 3.1.3.1 Cleaning By Hand or Mechanical Means

Rail, joint bars, gage rods, tie plates, rail anchors, and other materials shall be cleaned by hand or mechanical means to remove all adhering dirt and heavy rusting so that the bare steel can be examined.

##### 3.1.3.2 Visual Examination of Rails

Rails shall be visually examined for evidence of defects such as those illustrated on AREMA Form 402-A found in Section 4-3 of AREMA-01. Such defects shall be brought to the attention of the Contracting Officer who will be the final judge as to the serviceability of the rail. Rails having bolt hole cracks or end batter under paragraph TRACK REPAIR that can be reconditioned for use by cropping and redrilling shall be marked at the location of the defect with yellow paint. Rails with other defects or which cannot be reconditioned shall be rejected as scrap and shall be marked with bright red paint and stacked separately.

##### 3.1.3.3 Visual Examination of Joint Bars

Existing joint bars and compromise joint bars which are removed and no longer required at that location due to rail replacement or other work may be cleaned and reused at other locations, subject to review and approval of the Contracting Officer. Joint bars and compromise joints that are not reused shall be salvaged or scrapped. Joint bars shall be visually examined for defects and wear. Joint bars with bolt hole or spike slot cracks shall be scrapped. Bars which do not fit tightly against the rail or bars in which the bolt holes are excessively corroded or worn shall be scrapped. The Contracting Officer will be the final judge of the serviceability of joint bars. Scrapped bars shall be marked with bright red paint and stacked separately.

#### 3.1.3.4 Visual Examination of Gage Rods

Gage rods shall be visually examined for bends, cracks, or breaks. Bent, cracked, or broken gage rods shall be considered as scrap, marked with bright red paint and stacked separately.

#### 3.1.3.5 Visual Examination of Tie Plates and Rail Anchors

Tie plates and rail anchors shall be visually examined for cracks, breaks, excessive wear, and excessive corrosion. Track material with these defects shall be considered scrap, marked with bright red paint and stacked separately.

#### 3.1.3.6 Gage Rods

Gage rods which exist in tangent track and in curved track with a curvature of 10 degrees or less shall be removed and salvaged. Salvaged gage rods that have been inspected and cleaned shall be reused to the maximum extent possible.

#### 3.1.3.7 Grade Crossing Materials

Existing premanufactured grade crossing panels, rail and other track materials shall be salvaged as indicated, or as designated by the Contracting Officer. All salvaged materials shall remain the property of the railroad, and shall be reinstalled or stockpiled as indicated. Grade crossing materials to be salvaged shall be removed, cleaned as required for proper reinstallation, marked or labeled as necessary for proper reinstallation, and transported to the reinstallation location or to the storage yard.

#### 3.1.4 Transport and Stack Excess and Salvaged Materials

##### 3.1.4.1 Material Not Used In Track Repair

Excess and salvaged materials which are not used in track construction work shall become the property of the Contractor and removed from the site.

##### 3.1.4.2 Stacking of Rails

Rails shall be stacked on approved sills a minimum of 6 in. above the ground. Rails shall be stacked with the heads up and with the ends even. Each layer shall be separated by at least three 2 by 4 in. wood strips evenly spaced along the length of the rail. Rail shall be grouped by weight, section, drilling, condition, length, and amount of wear. The weight, section, drilling, and length shall be marked on one of the rails near the mid-height of the stack. These markings shall be painted neatly

near one end of the rail.

#### 3.1.4.3 Stacking of Joint Bars, Gage Rods, and Tie Plates

Joint bars, gage rods, and tie plates shall be sorted by section, punching and condition and shall be stacked on pallets. Each pallet stack shall be steel banded for forklift handling. The maximum weight on any pallet shall be 1,500 lbs. Compromise joint bars shall be wired together in pairs and stacked on pallets, separate from other bars.

#### 3.1.4.4 Containers

Rail anchors shall be sorted by type and size and placed in kegs, steel drums, or other approved containers. Containers shall be labeled with the rail weight and section.

#### 3.1.4.5 Stacking of Special Trackwork Materials

Special trackwork materials shall be palletized and stacked as directed by the Contracting Officer. The rail weight, rail section, and length shall be marked on each switch point. The weight, section, and frog number shall be marked on the side of each frog casting. Other switch materials salvaged shall be placed in steel drums and labeled as to rail weight, section, length of points, and turnout size.

#### 3.1.5 Material to be Scrapped

Ties shall be scrapped in accordance with requirements of Section 02120.

### 3.2 PLACEMENT OF BALLAST AND SUBBALLAST

Ballast shall be placed to the lines and grades indicated. Subballast shall conform to the requirements of aggregate base of Section 02300 EARTHWORK. Ballast shall not be placed on soft, muddy, or frozen areas. Where the prepared subgrade (roadbed) is soft, muddy, rutted, exhibits severe depressions, or is otherwise damaged, the ballast shall not be placed until the damaged subgrade has been repaired and the area has been approved by the Contracting Officer.

#### 3.2.1 Ballast

##### 3.2.1.1 Ballast Placement

All areas shall require size AREMA Number 4 ballast.

##### 3.2.1.2 Ballast Distribution

Ballast shall not be distributed until the subgrade has been approved by the Contracting Officer. No payment will be made for ballast which is distributed without the Contracting Officer's approval.

- a. Ballast distribution shall be to the depth indicated and may be from either trucks or railroad cars.
- b. Forming of ruts that would impair proper roadway drainage shall be prevented when distributing ballast from trucks and off track equipment. Any ruts formed greater than 1 in. shall be leveled and graded to drain.

- c. Ballast shall be unloaded as close as possible to the point of use so that unnecessary handling is prevented. Excess ballast shall be picked up and redistributed at the Contractor's expense.
- d. Ballast cars shall not be released until they have been inspected. Ballast cars may be weighed by the Government before and after dumping the ballast at no cost to the Contractor.

#### 3.2.1.3 Ballast Below Ties

For new construction, ballast below the tie, the shoulder ballast and the ballast in the tie cribs shall be placed subsequent to the rail and tie installation. For surfacing existing track, the ballast shall be placed subsequent to rail and tie replacements.

### 3.3 TRACK CONSTRUCTION

Track construction not covered specifically herein shall be in accordance with AREMA recommendations and recommended practices. Note: CPUC minimum walkway clearance per General Order No. 118 shall be maintained.

#### 3.3.1 Roadbed Preparation

Clearing and grubbing, grading, excavation, embankment preparation, and subgrade preparation shall be performed in accordance with Section 02300 Earthwork. Roadbed surface, grade, and drainage shall be approved prior to any distribution of construction material. Where the subgrade or roadbed is damaged during distribution of materials, ruts and depressions shall be filled and compacted and the roadbed surface reapproved prior to track construction.

#### 3.3.2 Unloading the Materials

The use of picks in the handling of ties will not be permitted. Rails shall be unloaded from cars with an approved derrick or crane and placed with the head up without dropping and with sufficient support under the base. Rails of proper length shall be distributed as necessary for road crossings, switches, joint spacing, and other special conditions. Cranes and crane operators shall be in compliance with EM 385-1-1 for the life of the Contract.

#### 3.3.3 Ties

Standard center-to-center spacing of crossties shall be 19 1/2 in. Ties shall be laid perpendicular to the center line of the track with the grain up (heartwood side down). The ends of ties on one side of the track shall be parallel to the rail and the center of the tie shall be on the approximate center line of the track. The ends shall be aligned on the inside of curves and shall continue on that side until reaching a curve in the opposite direction. On double tracks, the ties shall be aligned on the outside ends. The top surface of ties shall provide full bearing for the tie plates. Adzing shall be restricted to that necessary to provide a sound true bearing for the tie plate. Adzing in excess of 0.2 in. will not be permitted. Where adzing is necessary, the cut surface shall be completely saturated with creosote or other approved preservatives.

#### 3.3.4 Tie Plates

Tracks shall be fully tie-plated. Tie plates shall be free of dirt and



other foreign material when installed. Tie plates shall be placed so that the rails will have full bearing on the plate, and the plate will have full bearing on the tie. Tie plates shall be set at right angles to the rail with the outside shoulder against the base of the rail, and centered on the tie. Canted tie plates shall be installed to cant the rail inward. Contractor shall not use un-canted tie plates.

### 3.3.5 Rail

The base of the rail and the surface of the tie and tie plate shall be free of dirt and other foreign materials prior to laying rail.

### 3.3.6 Jointed Rail

#### 3.3.6.1 Laying Rail

Rail shall be laid without bumping or striking, to standard gage ( 4 ft 8-1/2 in. between points 5/8 in. below the top of the rail) on tangents and on curves up to 12 degrees. The track shall be gauged at every third tie as spikes are being driven.

- a. Jointed rails shall be laid, one at a time, with space allowance for expansion being provided between rail ends in accordance with TABLE VI.
- b. Gaps between rail ends in insulated joints shall only be sufficient to permit insertion of standard end posts.
- c. A standard rail thermometer shall be used to determine the rail temperature. The thermometer shall be laid close to the web on the side of the rail base which is shaded from the sun's rays in advance of the laying operation and left there long enough to accurately record the temperature. The contractor quality control representative shall see that rail temperature is checked frequently and that proper rail expansion shims are used. All thermometers shall be calibrated against the Contracting Officer's rail thermometer which will have been accurately calibrated and will be considered as the standard.
- d. Except through turnouts and at insulated joints, the staggering of the joints on one side shall not vary more than 18 in. in either direction from the center of the opposite rail.
- e. Rails less than 33 ft in length shall not be used in out-of-face rail relay. However, rails not less than 13 ft long may be used for final connections to existing rails to prevent joints from occurring at prohibited locations or to provide the specified joint stagger in curves.
- f. Rail joints shall not occur in or within 20 ft of a road crossing, alongside of or within 5 ft of the end of any switch or turnout frog guardrail.

#### 3.3.6.2 Joints

The joints in opposite rails shall be staggered one-half the rail length but not less than 12 ft apart, except closer joints may be required at turnouts and insulated joints. Rail less than 13 ft in length shall not be installed in track. No joint shall be less than 3 ft from switch points.

No joint shall be installed within 20 ft of a road crossing, outer perimeter of any structure, or any location which restricts access to the joint. Where joints are required in these areas, the joints shall be welded.

### 3.3.6.3 Expansion Allowance

Allowance for expansion shall be provided at rail joints by using rail-expansion metal shims. Shims shall be removed to within 12 rails of the laying. Shims shall be of the thickness shown in TABLE VI. The temperature of the rail shall be determined by use of a thermometer placed on the rail base on the side away from the sun. Typical rail gap gauges are as shown.

TABLE VI. SHIM THICKNESS

33-Ft Rail 160 Joints per Mi		39-Ft Rail 135 Joints per Mi		78-Ft Rail 68 Joints per Mi	
Rail Temperature (degrees F)	Shim Thickness (in.)	Rail Temperature (degrees F)	Shim Thickness (in.)	Rail Temperature (degrees F)	Shim Thickness (in.)
Below -10	5/16	Below 6	5/16	Below 35	5/16
-10 to 14	1/4	6 to 25	1/4	35 to 47	1/4
15 to 34	3/16	26 to 45	3/16	48 to 60	3/16
35 to 59	1/8	46 to 65	1/8	61 to 73	1/8
over 60	1/16	over 66	1/16	over 74	1/16

### 3.3.6.4 Cutting Rail

Only rail saws or track chisels shall be used to cut rail. New holes shall be drilled. Holes shall not be burned in rail. Holes cut with a torch will not be accepted. When drilling of rail is necessary, all chips and burrs shall be removed before applying joints.

### 3.3.6.5 Matching Rails

Where relay rail is used, matching adjacent rails shall not cause lipped or uneven joints. Any mismatched rail ends shall be welded to provide proper match. Rail end mismatch shall not exceed 1/8 in. on gage or tread portions of rail.

### 3.3.7 Continuous Welded Rail (CWR)

#### 3.3.7.1 Laying Rail (CWR)

Continuous Welded Rail (CWR) shall be welded as specified in paragraph Thermite Welding Procedures. Cuts or holes in the CWR shall not be permitted except as indicated on the Drawings or specified herein. Rails shall be cut square and clean by means of either rail saws or abrasive cutting disks. Rail segments containing holes shall be saw-cut from the rail. Laying and fastening CWR in ballasted track shall be according to the following procedure:

- a. Rail seat area of plates shall be cleaned and free of loose material before and after placing the rail. Rail shall not be

dragged over or slid through the tie plates. Rail shall not be slid or dragged on ballast ties, crossing services, or other surfaces. Rail shall be handled base down only on approved rail rollers adequately spaced to support rail without kinking, bending, or turning over. Rail shall be pulled only with approved spreader bar and two point pick with approved rail tongs.

- b. Rails shall be laid out of face. All strings shall be laid in a consistent manner throughout the project.

#### 3.3.7.2 Rail Destressing

Three days prior to destressing of any track segment, Contractor shall notify the Contracting Officer indicating tracks and stationing to be destressed. Contracting Officer shall be present during all phases of CWR destressing, final rail fastening and final welding of joint at each CWR section destressed and at time CWR destressing report is made. Final destressing of CWR rail in any track shall not proceed until the track has been completely ballasted and until the track has been raised to within one inch of final top of rail elevation and fully tamped and aligned to within one inch of final alignment.

#### 3.3.7.3 Rail Temperature

- a. Rail temperature and information specified for destressing of CWR track shall be recorded daily by the Contractor at the time of destressing and shall be furnished to the Contracting Officer within five days. CWR destressing reports (i.e. rail temperature record form) shall be developed by the Contractor and at a minimum shall contain the following information:

- 1) Beginning and ending location by station, track destination and left or right hand rail.

- Date and beginning and ending time of each day or for each section of rail destressed.

- Air temperature, rail temperature and approximate weather conditions shall be recorded every 15 minutes.

- Method of adjustment applied to CWR strings.

- Rail end gap at the completion of destressing operations, after spiking.

- b. Rail temperature shall be determined by means of a rail thermometer as specified in Chapter 5, Part 5.3 of the AREMA-01 Manual. Rail thermometers shall be placed on the shaded side of the rail base next to the web and shall be left in place until no change in its reading is detected, but not less than five minutes. Temperature shall be taken at the time of adjusting the gap between rail ends.
- c. The rail temperature shall be recorded every 15 minutes during the fastening process.
- d. When rail temperature deviates from the specified zero thermal stress range, fastening shall cease until the rail temperature returns to within the specified range.

#### 3.3.7.4 Gap

During the rail laying, the gap between CWR strings shall be determined by using the equation:

$$G = (t-T)LK+Q$$

Where:

G = Rail gap in inches;  
t = Optimum fastening temperature for type of track construction;  
T = Actual rail temperature at time of laying in degrees F;  
L = One-half the sum of the length of the rail being laid and the length of the preceding rail;  
K = Coefficient of thermal expansion for rail steel (0.000078 inch per foot per degree F); and  
Q = Rail gap as required by manufacturers of field weld kit in inches. For glued standard joints Q equals zero and for glued insulated joints Q equals the end post thickness.

#### 3.3.7.5 Dutchman

Contractor shall prevent damage to the rail ends during rail laying, ballasting and other operations requiring passage of on-track equipment over temporary rail joints. At any time temporary rail end gap exceeds 1/2 inch, a dutchman shall be inserted and maintained until final thermite rail weld or rail joint is installed. The dutchman shall be removed prior to adjusting or fastening of rail strings and when thermal expansion results in the temporary rail end gap closing.

- a. The dutchman, equal in length to G minus 1/2 inch where G is determined by the formula in the preceding paragraph, shall be inserted after the rail has been laid, except that no dutchman shall be inserted when the computed rail gap G is less than 1-1/2 inches.
- b. The dutchman shall be removed prior to fastening and when the rail temperature results in a calculated closure of the rail gap.

#### 3.3.7.6 Clamping

Rail shall be installed and clamped to produce zero thermal stress in the rail at 100 degrees F, plus or minus ten degrees F.

- a. Zero thermal stress in CWR may be achieved by heating, cooling, or pulling the rails, or a combination thereof. Methods for artificially obtaining zero thermal stress shall be subject to approval prior to use.
- b. When zero thermal stress is obtained, fastening shall begin immediately.
- c. The stress within the rail shall remain within the specified zero thermal stress range during the installation of thermite rail welds.
- d. Once zero thermal stress has been obtained, the correct rail gap

shall be maintained until the rail is fully fastened.

- e. Vibrators used for relieving internal rail stresses shall be of a type acceptable and shall not damage the CWR. Rail vibration shall be performed with a mechanical device producing a frequency of 900 to 1,000 Hz and a force of 160 pounds per cycle acting on the head of the rail.
- f. CWR shall not be struck with objects that will damage the rail surface.

#### 3.3.7.7 Fastening

Fastening of rail in ballasted track shall be accomplished by the installation of spikes. The optimum fastening temperature and permissible temperature range shall be as specified herein.

- a. The fastening temperature of each rail in a track shall be within the allowable range specified herein and shall be within 5 degrees F of the opposite rail fastening temperature.
- b. Prior to placing on-track equipment on newly laid rail, the rail shall be secured in a manner that will prevent damage to the rail, or to the track material.
- c. Equipment shall be moved over partially secured track in such a manner as to prevent damage to structures and trackwork materials.
- d. Newly laid rails on ballasted track shall be temporarily fastened at the specified gage at not less than every fifth tie on tangents and on curves having a radius greater than 1,000 feet. The temporary fastening shall be accomplished by installing two spikes on every fifth tie for both rails. One spike per rail per cross tie on each rail shall be installed on the remaining ties.

#### 3.3.7.8 Joint

During construction, rail weld or joint shall not be permanently installed until rail strings on either side are destressed. Each and all rails to be destressed shall have all fastening removed to allow rail to run freely for full length of each CWR string. When existing track or rail previously destressed is cut or realigned or for any other reason, fastening on CWR strings shall be removed for 300 feet each side of rail joint or cut and each CWR string for 300 feet shall be adjusted within the specified zero thermal stress temperature range. Each and all rails to be destressed shall be vibrated to relieve internal rail stresses for full length of each rail, working from the fixed end or anchored rail end toward the location of the destressing/tie-in weld or joint.

Once rail has been vibrated and proper rail gap established, rail fastenings shall be reinstalled working from fixed end of CWR string toward rail end or joint to be made. CWR strings shall be fastened such that there will be no unfastened portions of the same rail longer than 39 feet between fastened portions of the same string. CWR strings shall be fully fastened before thermite weld or rail joint is made. When the required rail gap cannot be obtained or cannot be held to make the thermite weld or rail joint in the manner described above, fastening on the shorter string or the up-grade string shall be removed, the string moved, length adjusted and string vibrated again before refastening to obtain specified rail end gap.

### 3.3.7.9 Final Joint

When the final destressing rail joint is made to join two strings of CWR, the rail gap shall be as specified by the manufacturer of the thermite weld kit or as required to install insulated rail joint end post or bolted rail joint, if used. Contractor operations must join two CWR strings to prevent any movement and final weld or joint made as part of the same destressing operation. CWR strings that are not fully restrained such that rail end gap changes prior to final weld or joint, will require release of both strings and readjustment to neutral temperature.

### 3.3.7.10 Final Surfacing and Aligning

After the track has been installed, ballast shall be placed in the tie cribs and shoulders of the track structure to restrain movement of the track due to temperature changes in the CWR. Ballast shall be unloaded in sufficient quantities which will form a high shoulder and will fill the tie cribs and provide an adequate amount of ballast for the initial track lift, plus a surplus as required to continue to hold the track in line after the initial track lift. Track surfacing shall be by methods that will prevent undue bending of the rail, straining of joints, and damaging or loosening the fasteners. The amount of track lift shall neither exceed 4 inches nor endanger the horizontal and vertical stability of the track. The track shall be raised so that a final lift shall not be less than 1 inch or more than 2-1/2 inches when bringing the track to the final surface. After the track has been finally raised, lined and surfaced, the rails shall be refastened within the specified zero thermal stress temperature range. Ties and fastening devices damaged during the surfacing operation shall be removed and replaced with new ties and fastening devices. Surfacing shall be discontinued when the rail temperature is higher than 110 degrees F.

### 3.3.8 Joint Bars

Joint bars shall be clean, and the contact surfaces coated with petrolatum or petrolatum base compound with a corrosion inhibitor. Rail joints shall be installed so that bars are not cocked between the base and head of the rail. Bars shall be properly seated in the rail and the full number of correct-size bolts, nuts, and spring washers installed. Bolts shall be placed with nuts alternately on inside and outside of rail. A corrosion resistant lubricant shall be applied to the bolt threads prior to application of nuts. Bolts shall be tightened to torque per Union Pacific Standards beginning at the center of the joint and working both ways to the ends of the joint. After the track has been in service, but before acceptance of the work, all bolts shall be checked and retightened per Union Pacific Standards. Rail of different sections shall be connected by properly fitting compromise joint bars. The mismatch for compromise joints for either tread surface or on the gage side shall not exceed 1/8 in.. Defective joint bars designated on the contract drawings, discovered by the Contractor during track repair operations, or as identified by the Contracting Officer shall be replaced with acceptable joint bars.

### 3.3.9 Spiking

#### 3.3.9.1 Spiking Procedures

Rail shall be spiked promptly after being laid, except as specified in paragraph LAY CONTINUOUS WELDED RAIL (CWR). Spikes shall be started and driven vertically and square with the rail. Spikes shall be driven to allow

approximately 1/8 to 3/16 inch space between the underside of the spike and the top of the rail base. Spikes shall not be overdriven, or straightened while being driven. Spikes shall not be installed through the slots in skirted-type, slotted joint bars (angle bars). Spikes shall not be driven against the ends of joint bars.

#### 3.3.9.2 Number of Spikes

Four rail-holding spikes shall be used on each tie on tangents and curves less than 4 degrees. Spikes on the gage side of the running rail shall be placed directly across from each other and the spikes on the field side of the running rail shall be placed directly across from each other. This pattern shall be held consistent. On curves 4 degrees or greater but not more than 8 degrees, six spikes shall be used on each tie with the spikes located as follows: High rail, one rail-holding spike and one plate holding spike on the field side and one on the gage side; Low rail, one rail-holding spike on the gage side, one rail-holding spike on the field side, and one plate-holding spike on the field side. Curves 8 degrees and greater shall be spiked with eight spikes per tie, located as follows: High rail, one rail-holding spike and one plate-holding spike on the field side and two rail-holding spikes on the gage side; Low rail, one rail-holding and one plate-holding spike on both the gage and field sides. Eight rail-holding spikes shall be used on each tie through road crossings.

#### 3.3.10 Tie Plugs

If spikes are withdrawn, the holes shall be swabbed with creosote and plugged with creosoted tie plugs of proper size to fit the hole. If spikes are withdrawn and spikes are to be reinserted in existing spike holes, the holes shall be swabbed with creosote and plugged with creosoted tie plugs prior to re-driving the spike. Tie plugs shall not be installed in prebored holes unless spikes have been driven and withdrawn.

#### 3.3.11 Rail Anchor Placement

Rail anchors shall conform to the provisions of AREMA-01, Chapter 5, Section 7 and Union Pacific Standard drawing 0460D - Rail Anchor Patterns for New Rail Installations. The rail anchors shall be installed and spaced in accordance with Union Pacific Standard Drawing 0460D. Rail anchors shall be installed to the gage side of the rail against the same tie face on opposite rails. Rail anchors shall grip the base of the rail firmly and shall have full bearing against the face of the tie. Rail anchors shall not be moved by driving them along the rail. Rail shall be anchored immediately after spiking and before rail has experienced a large temperature change.

#### 3.3.12 Inner Guard Rails

Guard rails shall be installed on bridges per Union Pacific Standards. Guard rails shall be approximately 11 in. from the gage side of track rails and shall extend a minimum of 50 ft beyond the structure. The ends shall be curved inward and beveled. Guard rails shall be fully bolted. Guard rails shall not be higher than the running rail and shall not be more than 1 in. lower than the running rail. Each guard rail shall be spiked with two spikes to each tie but shall not be tie-plated.

#### 3.3.13 Turnouts and Crossovers

Turnouts and crossovers shall be located as indicated on the drawings.

Switch, frog and frog guardrail assemblies shall be complete. Stock rails shall be accurately bent. Changes in rail weight or section will not be permitted within the limits of the switch ties or crossing track. Head blocks shall be at right angles to the main track and shall be securely spiked in place. Except where directed otherwise, switch stands shall be installed so that when the switch is set for the normal position, the connecting rod keeps the points closed with a pulling force. Switches shall be properly adjusted. Switch components and slide plates shall be lubricated.

### 3.3.14 Superelevation

Curves shall be superelevated as shown on the drawings unless otherwise directed by the Contracting Officer. Superelevation shall be obtained by raising the outside rail of the curve. The inside rail shall be maintained at grade. Full superelevation shall be carried throughout each curve, unless otherwise directed or shown on the drawings. Superelevation runoff shall be at a uniform rate, and shall extend at least the full length of the spirals. The normal rate of superelevation runoff will be 1/2 in. in 31 ft.

### 3.3.15 Preliminary Surfacing

The preliminary alignment and surfacing gangs shall follow the unloading of the ballast. Rail renewal, tie renewal, bolt tightening, and ballast placement shall be complete prior to commencement of surfacing and alignment work.

#### 3.3.15.1 Lifts

- a. The track, after being aligned, shall be brought to grade and surface in lifts not exceeding 4 in. each. After each lift, the ballast shall be tamped. When using jacks, they shall be placed close enough together to prevent undue bending of rail or stress of rail and joint. Both rails shall be raised at one time and as uniformly as possible, except where superelevation is required. The track shall be so lifted that after a period of not less than 5 train operations (70 ton ballast car) after the last lift, it will be necessary to give the track a final lift of between 1 and 2 in. to bring it to grade.
- b. In areas where major track resurfacing is not required, the Contractor shall perform a "skim lift" tamping operation to ensure that the ties are adequately tamped, the ballast section is adequately compacted and dressed, and to correct minor deficiencies in surface and alignment. The rise in skim lift areas shall be 1 in. or less and usually will not require that additional ballast be placed.
- c. A 2 in. rise shall provide an average 2 in. raise in the track being surfaced.
- d. A 4 in. rise shall provide an average 4 in. raise in the track being surfaced, and shall be made in at least two lifts not to exceed 2 in. per lift.
- e. A 6 in. rise shall provide an average 6 in. raise in the track being surfaced, and shall be made in at least 2 lifts. The initial lift shall not exceed 4 in. with the final lift not to



exceed 2-1/2 in.

### 3.3.15.2 Tamping

Raising and tamping of track shall be performed with an automatic, vibratory, squeeze type power tamper with 16 tamping heads, capable of raising both rails simultaneously and maintaining cross-level. The equipment to be used for surfacing operations is subject to approval by the Contracting Officer. Every tie in the track shall receive two or more full insertions of the tamping heads. Ballast shall be power-tamped under both sides of ties from each end to a point 12 in. inside each rail for 8-ft ties, 15 in. inside each rail for 8 ft-6 in. ties, and 18 in. inside each rail for 9 ft and 10 ft ties. The center shall be filled with ballast, but tamping will not be permitted in the center of the tie between the above stated limits. Both ends of the ties shall be tamped simultaneously and tamping inside and outside of the rail shall be done at the same time. Tamping tools shall be worked opposite each other on the same tie. Ballast under switch ties and road crossing ties shall be tamped the entire length of each tie. All ties shall be tamped to provide solid bearing against the base of the rail after the track or turnout is raised to grade at final surfacing. All down ties shall be brought up to the base of rail and shall be machine tamped. The resultant track surface and alignment shall be uniform and smooth. Tamping of track in snow or frozen ballast conditions will not be permitted.

### 3.3.15.3 Replacement of Ties

After tamping has been completed and the jacks removed, all ties pulled loose shall be replaced to their proper position, respiked and retamped to provide full bearing against the rail.

### 3.3.15.4 Runoff of Track Raises

The runoff at the end of a rise shall not exceed 1/2 in. in 31 ft of track unless otherwise approved by the Contracting Officer.

### 3.3.15.5 Horizontal Realignment

Horizontal realignment of curved track shall be established by the Contractor using manual or mechanical means as described in the AREMA-01 Chapter 5, Part 3 article titled, "String Lining of Curves by the Chord Method".

### 3.3.16 Final Surfacing

After preliminary surfacing has been completed, grade and line stakes shall be checked and the track brought to grade and alignment.

#### 3.3.16.1 Final Tamping

Track shall be brought to grade and the ballast retamped in the manner described for preliminary surfacing, except that the tamping distance inside the rail shall be decreased from 12 to 10 in. for 8 ft. ties, 15 to 13 in. for 8 ft 6 in. ties, and 18 to 16 in. for 9 ft and 10 ft ties.

#### 3.3.16.2 Final Alignment

The track shall be given a final aligning conforming to the established track centers.

### 3.3.16.3 Final Dressing

After the final alignment the ballast shall be dressed to the section indicated. After final dressing ballast shall not cover the tops of the ties. The portion of the subgrade outside the ballast line shall be left with a full, even surface and the shoulder of the subgrade shall be properly dressed to the indicated section to provide proper drainage away from the track.

### 3.3.16.4 Surplus Ballast

Surplus ballast remaining after final surfacing and dressing of the ballast section shall be distributed or otherwise disposed of as directed by the Contracting Officer.

### 3.3.17 Cleanup

Upon completion of the work, the Contractor shall remove all rubbish, waste, and discarded materials generated by the work from the project area areas where the Contractor has worked, including but not limited to, project areas, material storage sites, and borrow or disposal areas shall be left in a clean, well-graded, and well-drained condition.

#### 3.3.17.1 Shoulder Removal and Reconstruction

Where track construction operations result in deposition of materials along the track shoulders that would impede the free drainage of the geotextile and track structure, the Contractor shall remove the material. Where undercutting operations leave fouled shoulder materials that impede free drainage of the geotextile and the track structure, the shoulder material shall be removed, and the ballast shoulders shall be reconstructed using the materials and dimensions as indicated.

#### 3.3.17.2 Spoil Materials

Spoil materials removed from the track shall be disposed of off site at the Contractor's expense. Spoil materials shall not be placed on the shoulders, in ditches, in drains, or in other areas where they would impede the flow of water away from the track.

### 3.3.18 Final Adjustments

Sixty calendar days after the track has been accepted and put into operation, the Contractor shall perform, at no cost to the Government, necessary resurfacing adjustments to leave the track in alignment and on grade.

### 3.3.19 Tolerances for Finished Track

Completed track shall meet the following tolerances. Track not meeting the tolerances specified below shall be repaired to meet these requirements, at no additional cost to the Government.

#### 3.3.19.1 Gage

Track gage shall be within plus 1/4 in. or minus 1/8 in. of standard gage.

#### 3.3.19.2 Alignment

Alignment shall be measured as the deviation of the mid-offset of a 62 ft line, with the ends of the line at points on the gage side of the line rail, 5/8 in. below the top of the rail head. Either rail may be used as the line rail on tangent track; however, the same rail shall be used for the entire length of the tangent. The outside rail in a curve is always the line rail. Alignment on tangents shall not deviate from uniformity more than 1/2 in. Alignment on curves shall not deviate from uniformity more than 3/8 in.

#### 3.3.19.3 Track Surface

Track surface shall meet the following requirements:

- a. The runoff at the end of a raise shall not exceed 1/2 in. in any 31 ft of rail.
- b. The deviation from design profile on either rail at the mid-ordinate of a 62 ft chord shall not exceed 1/2 in.
- c. Deviation from design elevations on spirals shall not exceed 1/2 in.
- d. Deviation from zero cross level at any point on tangent or from designated superelevation on curves or spirals shall not exceed 1/2 in.
- e. The difference in cross level between any two points less than 62 ft apart on tangents, and on curves between spirals shall not exceed 1/2 in.

#### 3.3.19.4 Guard Face Gage

Guard face gage is the distance between the guard lines measured across the track at right angles to the gage line, and is measured at the point of frog on both sides of the turnout. The design value for guard face gage is 52-3/4 in. Guard face gage shall be within plus or minus 1/8 in. of the design value.

#### 3.3.19.5 Guard Check Gage

Guard check gage is the distance between the gage line of a frog and the guard line of its guard rail, or guarding face, measured across the track at right angles to the gage line. The design value for guard check gage is 54-5/8 in. Guard check gage shall be within plus or minus 1/8 in. of the design value.

### 3.4 TURNOUTS AND CROSSOVERS

#### 3.4.1 Turnout Reconstruction

Note: CPUC minimum walkway clearance per General Order No. 118 shall be maintained.

##### 3.4.1.1 Salvage and Install Turnouts

Turnouts shall be salvaged (removed) and installed. This work consists of removal of the turnout, transporting to the installation site all turnout materials except the switch ties, and reconstructing the turnout using new

switch ties.

#### 3.4.1.2 Turnout Removal and Salvaged or Scrapped

Materials from turnouts that are removed from the track and that are not to be reinstalled, shall be either salvaged or scrapped as indicated on the drawings.

#### 3.4.1.3 Track bed

The track bed shall be prepared by excavating and wasting existing ballast or subgrade materials and establishing a firm top of subgrade as indicated on the contract drawings.

#### 3.4.1.4 Turnout Locations

The turnouts shall be constructed at the locations indicated on the contract drawings. Dimensions, details, and configuration of each turnout shall be as indicated on AREMA-02 Plans Nos. 910 and 911. Switch ties shall be placed as indicated on AREMA-02 Plans Nos. 112 and 912. The end of a switch tie shall not be within 14 in. of a spike. Connecting tracks shall be shifted to their new alignments as shown on the contract drawings and all tracks connected to the turnout. Tracks shall be placed within 0.1 ft of design alignment prior to ballasting work.

#### 3.4.1.5 Matching

Switch points/stock rails, rail joints, frog castings, and other parts of the turnout that must fit together shall fit properly and be of the proper match. Both rail ends at all rail joints throughout the turnout and at the joints at the frog shall be matched on both the top (tread portion) and on the gage side of the rail. Rail end welding and grinding are not acceptable methods to achieve a good match.

#### 3.4.1.6 Placing of Ballast

Ballast shall be placed as required and the turnout brought to proper grade in a minimum of three lifts. The initial lift shall not exceed 4 in. The final lift shall not exceed 2 in. and all tracks shall be brought into final alignment at that time. Tamping, ballast dressing requirements, and alignment tolerances shall be as indicated in paragraph TRACK CONSTRUCTION.

Ballast level in cribs beneath the connecting rod, switch point rails, and switch rods shall be at least 4 in. below any steel.

#### 3.4.1.7 Existing Switch Stand

The existing switch stands and new switch stand shall be installed and the switch operating mechanisms adjusted so that the switch operates smoothly and without excessive force being required. All switch plates and connection points in the switch rod shall be lubricated with a switch lubricant, which does not allow sand or debris to adhere to the lubricant.

### 3.5 HIGHWAY CROSSINGS

Highway and other crossings within the project shall be constructed as indicated on the contract drawings.

#### 3.5.1 Subgrade

For new construction, the subgrade in the crossing area and for 20 ft beyond each end of the crossing shall be bladed to a level surface and compacted to at least 95 percent. The subgrade shall be bladed to a level surface. Drainage areas shall be cleaned and sloped away from the crossing in both directions along the track and the roadway.

### 3.5.2 Ballast Placement and Surfacing

Ballast shall be placed and tamped as specified in paragraph TRACK CONSTRUCTION except that in crossings, the ballast between the ties shall be thoroughly compacted with a vibratory compactor, or other approved means, after each raise. The ballast shall be tamped for the entire length of the crossties for highway crossings. The track shall receive final alignment and surfacing prior to placement of the crossing surface. Final surfacing shall bring the track to the final grade and alignment as indicated on the contract drawings. Where the crossing involves two or more tracks, the top of the rail for all tracks shall form a plane with the adjacent roadway surface. The top of rail elevation shall be 2 to 4 in. above surrounding pavement elevation, with a smooth transition of pavement. The ballast in the cribs and on the shoulders shall be compacted using a vibratory plate compactor or other approved means.

### 3.5.3 Ties

Hardwood ties shall be used. Spacing shall be a minimum of 19 1/2 in. center to center. For premanufactured grade crossings, ties shall conform to the manufacturer's recommendations for the type of grade crossing surface materials being used.

### 3.5.4 Tie Plates, Spikes, and Anchors

All ties within the crossing and for 20 ft beyond each end of the crossing shall be fully tie plated, and spiked with 4 rail-holding spikes per tie plate. Rubber tie pads shall be installed between the tie and tie plate on all ties within the crossing area and for 20 ft beyond each end of the crossing.

### 3.5.5 Rail

Rail within the crossing area and for 20 ft beyond each end of the crossing shall be, at a minimum, 136RE lbs/yd. Field weld the joints to form continuous rail throughout the crossing area or by using 78 ft rail lengths.

### 3.5.6 Lining and Surfacing

Rail shall be spiked to line and the track mechanically tamped and surfaced to the grade and alignment of the existing track and roadway. Where the crossing involves two or more tracks, the top of rails for all tracks shall be brought to the same plane.

### 3.5.7 Crossing Surface

The surface of the highway shall be not greater than 1/4 in. higher than the top of the rails for a distance of 2 ft outside of the rails for either single or multiple-track crossings. A smooth transition shall be made between the crossing surface and the adjoining pavement.

#### 3.5.7.1 Cedar Grove Park Crossing

This crossing shall be installed with sized timber in place. The surface of the crossing timbers shall form a smooth plane with the top of the rails and the adjacent roadway surface. The crossing timbers shall be attached to the ties with appropriate size and length fasteners.

#### 3.5.7.2 Lakeville Street Crossing

This crossing and crossing materials shall be installed in accordance with the crossing manufacturer's instructions. Tie spacings and track materials used in the crossing shall be in accordance with the installation instructions and manufacturer's recommendations.

#### 3.5.8 Signs and Signals

The type, location, and installation of railroad-highway crossing warning signs and signals shall conform to 49 CFR 234 Grade Crossing Signal System Safety and CPUC G.O. No. 75-C and further by the requirements of Chapter 33, Part 5 of AREMA-01.

##### 3.5.8.1 Location and Positioning of Signs

Signs for both highway and railroad track installation shall be located and erected as shown. Unless otherwise shown, signs shall be erected so that sign face is vertical and at a deflection angle of 87 degrees from the center of the highway lane or track which the sign serves and facing the direction of travel. Where lanes or tracks are on curves, sign faces shall be on a deflection angle of 87 degrees to the tangent to the curve. Signs shall be erected so that specular reflection is minimized or eliminated. After installation is completed, the signs will be inspected during the day and at night by the Contracting Officer. If specular reflection is apparent on any sign, its positioning shall be adjusted to eliminate or minimize this condition. This adjustment and any subsequent adjustments shall be at no additional cost to the Government.

##### 3.5.8.2 Traffic Control

During installation of highway signs, the Contractor shall provide for the safe and expeditious movement of traffic through the work area. Schedule of lane closures, work zone safety and traffic control, and related items shall be provided.

#### 3.5.9 Crossing Flangeways

Upon completion of the grade crossing installation, the flangeways through the crossing shall be a minimum of 2 in. deep and between 2-1/2 and 3 in. wide. The Contractor shall ensure that adequate flangeways are provided prior to installation of the final crossing surface. Flangeway fillers shall be rubber for concrete crossing and wood for wood crossing.

##### 3.5.9.1 Clean Grade Crossing Flangeways

Where grade crossing flangeways are obstructed (filled in), the Contractor shall remove foreign material to provide a minimum 2 in. depth and 2-1/2 in. width flangeways on the gage side of the rails.

#### 3.6 CONDUITS

Conduits shall be kept clean of concrete, dirt or foreign substances during construction.

### 3.6.1 Concrete Encasement

At railroad crossings, conduits shall be encased with concrete. Tops of concrete encasement shall be not less than 5 feet below the tops of rails.

### 3.6.2 Non-Encased Direct Burial

Bottoms of trenches shall be smooth and free of stones and sharp objects. Where bottoms of trenches comprise materials other than sand, a 3-inch layer of sand shall be laid first and compacted to approximate densities of surrounding firm soil before installing conduit. The first layer of backfill shall be sand to cover the conduit by 3 inches and be compacted as previously described. The excavation shall then be backfilled with soil and compacted in 3- to 6-inch layers.

## 3.7 CABLES

### 3.7.1 Cable Installation

Cable shall be installed strictly in accordance with the cable manufacturer's recommendations. Each circuit shall be identified by means of a plastic or non-ferrous metal tag, or approved equal.

### 3.7.2 Conduit Cleaning

Conduit shall be cleaned with an assembly that consists of a flexible mandrel that is 1/4 inch less than inside diameter of the conduit, 2 wire brushes and a rag. The cleaning assembly shall be pulled through conduit a minimum of 2 times.

### 3.7.3 Conduit Lubrication

The cable lubricant shall be compatible with the cable jacket for cable that is being installed. Application of lubricant shall be in accordance with lubricant manufacturer's recommendations.

### 3.7.4 Cable Test

Low-voltage cable shall be tested for insulation resistance after the cables are installed in their final configuration, ready for connection to equipment and prior to energization. The test voltage shall be 500 volts DC, applied for one minute between each conductor and ground and between all possible combinations of conductors in the same conduit. The minimum value of insulation shall be:

$$R \text{ in megohms} = (\text{rated voltage in kV} + 1) \times 1000 / (\text{length of cable in feet})$$

Each cable failing this test shall be repaired or replaced. The repaired cable shall be retested until failures have been eliminated.

## 3.8 BONDING AND GROUNDING TRACK

Track shall be bonded and grounded as indicated. Where track is designated for bonding and grounding, the rails shall be bonded electrically continuous and effectively grounded. Connections shall be made by cadwelds in accordance with the manufacturer's instructions.

### 3.8.1 Rail Joint Bond

Rail joints on both rails of designated track shall be bonded using an exothermic type bond as specified. The bond shall be attached to the rail head unless otherwise approved by the Contracting Officer. Track to be bonded and grounded shall be electrically insulated from the remaining track using one of the specified insulated joints.

### 3.8.2 Rail Cross-Bond and Ground

Rail cross-bond and ground shall be installed. using an exothermic type bond. The cross-bond shall be applied to the rail web. One cross-bond and ground shall be provided for each section of bonded and grounded track. Connections between grounding system or ground rods and rails shall be made with bare stranded copper cable, installed at least 12 in. below the bottom of the ties. Ground rods shall be driven vertically full-length. The top of the ground rod shall be located at the toe of the ballast slope and shall be a minimum of 12 in. below the top of the subgrade. Maximum resistance to ground from any grounded rail or structure shall not exceed 25 ohms. The Contractor shall make any corrections needed to reduce the resistance to below 25 ohms at no cost to the Government.

### 3.8.3 Inspection of Rail Bond and Ground

Loose, damaged, or missing rail bond wires, cross bond wires, ground connections, and ground rods shall be visually inspected. If there is a signal failure, bonding can be tested for current loss in the joints using a volt meter. Defective items shall be marked for repair.

### 3.8.4 Rail Bonds At Signalized Grade Crossings

CWR joints within the approach circuits to signalized highway grade crossings shall be double-bonded using both a rail head bond and a web bond. Rail head and web bonds shall be installed in the locations indicated where the existing rail bonds are missing, broken, or otherwise ineffective.

### 3.8.5 Existing Bonds

The Contractor shall protect existing rail bonds, cross-bonds, ground connections, and grounding rods from damage. Except for bonds attached to rails which are designated to be replaced in this contract, replacement of bonds damaged or destroyed by the Contractor's operation shall be replaced at no cost to the Government.

### 3.8.6 Removal of Defective Bonds

Rail head pin-type and welded-type bonds shall be removed by shear cutting old cables immediately adjacent to the weld or pin. Rail web type pin bonds shall be removed by knocking the old pin out with a drift. Flames or torches shall not be used to remove defective bonds.

## 3.9 INSTALLATION OF MISCELLANEOUS TRACK MATERIALS

### 3.9.1 Tie Plates

Tie plates shall be furnished to the work sites as required.

### 3.9.2 Rail Anchors



Rail anchors shall be delivered to the work sites as required.  
Installation shall be in accordance with paragraph TRACK CONSTRUCTION

### 3.9.3 Insulated Joints

Insulated joints shall be installed where indicated and in accordance with the manufacturer's installation instructions.

### 3.9.4 Inner Guard Rails

Inner guard rails shall be installed across the bridge as specified in paragraph TRACK CONSTRUCTION. Each rail shall be spiked to alternate crossties throughout the full length using two spikes per rail per tie; tie plates are not required. Guard rails shall be installed using acceptable joint bars of the proper size to fit the rails being joined. Each joint shall be bolted with at least two bolts and one fully tightened bolt per rail.

### 3.9.5 Gage Rods

#### 3.9.5.1 Rods Per Rail Length

Three gage rods shall be installed per rail length on all curved track with greater than 10 degrees curvature.

#### 3.9.5.2 Installation of Rods in The Crib and Closure Rail

One gage rod shall be installed in the crib immediately ahead of the switch point of all turnouts. Two gage rods shall be installed on the curved closure rail, one ahead of the joint, and one ahead of the toe of the frog in all turnouts.

### 3.9.6 Installation of Joint Bars

Joint bars shall be installed with their full number of bolt assemblies unless otherwise noted. Bars shall be properly seated on the rail and the bolts tightened beginning at the center of the joint and working toward the ends of the bars, alternating between rails. Bolts used shall be of the proper diameter and length for the rail and joint bars at the joint. The use of extra washers to shim out track bolt nuts is prohibited. Bolts with nuts shall be placed alternately on inside and outside of rail.

## 3.10 THERMITE WELDING PROCEDURES

Thermite welding procedures shall comply with the following paragraphs:

### 3.10.1 End Preparation

Rails to be welded shall meet the requirements of Paragraph 1, "Specifications for Fabrication of Continuous Welded Rail" given in Chapter 4, Part 2 of AREMA-01. The rail ends shall be aligned in accordance with paragraph GAP AND ALIGNMENT. Rail ends shall show no steel defects, dents, or porosity before welding. Bolt holes shall not be made in, or permitted to remain in, the ends of the rail to be welded. One handling hole may be made in each end of welded string. Rail ends containing such holes shall be cut off during track construction. Rail which must be cut for any reason shall be cut square and clean by means of approved rail saws or abrasive cutting wheels in accordance with Chapter 5 of AREMA-01, article, "Recommended Practice For Use of Abrasive Wheels".

### 3.10.1.1 Cleaning

The rails to be welded shall be cleaned of grease, oil, dirt, loose scale, and moisture to a minimum of 6 in. back from the rail ends, including the rail head surface. Cleaning shall be accomplished by use of a wire brush, to completely remove dirt and loose oxide and by use of oxygen-acetylene torch to remove grease, oil and moisture. A power grinder with an abrasive wheel shall be used to remove scale rust, burrs, lipped metal and mill brands which would interfere with the fit of the mold, for 2 in. on each side of the ends.

### 3.10.1.2 Gap and Alignment

The minimum and maximum spacing between rail ends shall be as specified by the rail welding kit manufacturer and the approved welding procedures.

- a. The ends of the rails to be welded shall be properly gapped and aligned to produce a weld which shall conform to the alignment tolerances below. Alignment of rail shall be done on the head of the rail. The rail gap and alignment shall be held without change during the complete welding cycle.
- b. Vertical alignment shall provide for a flat running surface. Any difference of height of the rails shall be in the base.
- c. Horizontal alignment shall be done so that any difference in the width of heads of rails shall occur on the field side. Horizontal offsets shall not exceed 0.04 in. in the head and/or 0.12 in. in the base.

### 3.10.2 Surface Misalignment Tolerance

Combined vertical offset and crown camber shall not exceed 0.04 in./ft at 600 degrees F or less. Combined vertical offset and dip camber shall not exceed 0.01 in./ft at 600 degrees F or less.

### 3.10.3 Gage Misalignment Tolerance

Combined horizontal offset and horizontal kink camber shall not exceed 0.04 in./ft at 600 degrees F or less.

### 3.10.4 Thermite Welding

Welding shall be done in accordance with Chapter 4, Part 2 of AREMA-01, articles "Thermite Welding - Rail Joints" and "Specifications for Fabrication of Continuous Welded Rail", except as modified by these specifications. All welds shall be visually inspected at the time of welding.

#### 3.10.4.1 Thermite Weld Preheating

The rail ends shall be preheated prior to welding to a sufficient temperature and for sufficient time as indicated in the approved welding procedures to ensure full fusion of the weld metal to the rail ends without cracking of the rail or weld.

#### 3.10.4.2 Thermite Weld Cooling

The molds shall be left in place after tapping for sufficient time to permit complete solidification of the molten metal and proper slow cooling to prevent cracking and provide a complete weld with proper hardness and ductility.

### 3.10.5 Weld Finishing and Tolerances

Welded joints in the finished track shall be brought to a true surface and alignment by means of a proper grinding or planing machine (shear). Finish grinding shall be performed with an approved grinder operated by a skilled workman grinding evenly and leaving the joints in a smooth and satisfactory condition. Finishing shall eliminate all cracks. The completed weld shall be finished by mechanically controlled grinding in conformance with the following requirements:

- a. A finishing deviation of not more than plus or minus 0.01 in. of the parent section of the rail head surface will be allowed. The gage side of the rail head shall be finished to plus or minus 0.01 in. of the parent section.
- b. Welds produced by welding kits which are specially designed to produce reinforced welds need not be ground in the finishing AREMA except as necessary to remove fins, burrs, cracks, etc.

### 3.10.6 Weld Quality

Each completed weld shall have full penetration and complete fusion and be entirely free of cracks or fissures. Welds shall meet the acceptance criteria given in AWS D1.1.

### 3.10.7 Weld Numbering

The Contractor shall semi-permanently mark a sequential weld number on the rail immediately adjacent to the weld, using a quality lead paint marker at the time the weld is made. Welds shall be numbered sequentially in the order in which they are made. The Contracting Officer will provide the Contractor with the initial weld number. Defective welds which are replaced shall be assigned a new sequential number by adding a letter to the defective weld number (e.g., defective weld 347 would be replaced by 347A).

## 3.11 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. The first inspection of the facilities will be at the expense of the Government and any subsequent inspections required because of failure of the first inspection shall be at the expense of the Contractor. Such costs will be deducted from the total amount due the Contractor.

### 3.11.1 Ballast and Subballast Samples

Periodic sampling and testing of ballast material shall be performed to ensure continued compliance with this specification. Test samples shall be reduced from field samples in conformance with ASTM C 702. Sample sizes shall be sufficient to provide the minimum sample sizes required by the designated test procedures. If any individual sample fails to meet the gradation requirement, placement shall be halted and immediate corrective action shall be taken to restore the specified gradation. If any individual sample fails to meet the specified quality and soundness

requirements, placement shall be halted and immediate corrective action shall be taken to restore the specified quality.

### 3.11.2 Ballast Tests

#### 3.11.2.1 Sieve Analyses

Sieve analyses shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

#### 3.11.2.2 Bulk Specific Gravity and Absorption

Bulk specific gravity and absorption tests shall be made in conformance with ASTM C 127.

#### 3.11.2.3 Percentage of Clay Lumps and Friable Particles

The percentage of clay lumps and friable particles shall be determined in conformance with ASTM C 142.

#### 3.11.2.4 Degradation Resistance

Resistance to degradation of materials shall be determined in conformance with ASTM C 131 and ASTM C 535. Materials with gradations having 100 percent passing the 1 in. sieve, shall be tested in conformance with ASTM C 131. Materials having gradations with particles larger than 1 in. shall be tested in conformance with ASTM C 535.

#### 3.11.2.5 Soundness Test

Soundness tests shall be made in conformance with ASTM C 88.

#### 3.11.2.6 Percentage of Flat or Elongated Particles

The percentage of flat or elongated particles shall be determined in conformance with ASTM D 4791.

### 3.11.3 Tie Inspection

The Contractor shall be responsible for the quality of the treated ties. Each tie shall be permanently marked or branded by the producer in accordance with AWP A M6. Each treated wood tie shall be inspected, in accordance with AWP A M2, for conformance with the specified AWP A standards. Contractor shall core and check preservative once every 1,000 ties delivered to the site.

## 3.12 INSPECTION AND FIELD TESTING

Quality control inspection and field testing shall be performed by the Contractor. Carrier's track and signal inspectors are solely responsible for the final inspection and acceptance of the track and signal construction as compliant with the Rail Safety Act and applicable state and federal regulations.

### 3.12.1 Track

Inspection shall be performed to ensure that all the requirements of these specifications are met. Bolted joints shall be inspected for loose bolts and for smooth transitions between rails of different sections. Rail, tie

plates, and ties shall be checked to ensure that the rail is properly seated and has full bearing on the tie plate and tie. Upon completion of construction, measurements of track gage, cross level, and alignment shall be taken and recorded at least once every 100 ft of track centerline length. A copy of these measurements shall be provided to the Contracting Officer.

### 3.12.2 Welded Joints - Visual Inspection

Each welded joint shall be inspected by the Contractor in the presence of the Contracting Officer after removal of the mold and grinding of excess metal. The Contractor shall pay particular attention to surface cracking, slag inclusion, gas pockets, and lack of fusion. The Contractor shall correct or replace, at no extra cost to the Government, any weld found defective. The method of correction shall be as approved by the Contracting Officer.

### 3.12.3 Electric Arc Welding Inspection

Electric arc welds shall be inspected to determine that the item welded conforms to the desired contour and contains no visible cracks or voids.

### 3.12.4 Thermite Weld Joints Testing

Each thermite weld joint shall be ultrasonically tested following the visual inspection. The method of inspection and acceptance shall be in accordance with AWS D1.1. The Contractor shall correct or replace defective welds, at no additional cost to the Government. The method of correction shall be as approved by the Contracting Officer. Ultrasonic testing will be performed by the Government after the rail has been installed in track. The testing will determine whether or not each weld meets the criteria of paragraphs Gap and Alignment, Weld Finishing and Tolerances, and Weld Quality. Welds made in the track which the Contracting Officer determines to be unacceptable shall be cut out of the rail and replaced by a section of new rail and two new welds. Saw cuts shall be made at least 6 in. from the centerline of the faulty weld. Replacement welds and replacement rails shall be at the sole expense of the Contractor. Replacement welds shall be renumbered as indicated. Replacement welds made in track shall be ultrasonically tested and paid for by the Contractor.

### 3.12.5 Electric Arc Weld Testing

The welds shall be visually inspected and the contours checked after completion and later tested by the ultrasonic method. The Government will Contractor shall have the welds tested by the ultrasonic method. The testing will determine whether or not each weld meets the quality criteria. Defective welds will be removed and the item rewelded at the Contractors expense.

### 3.12.6 Testing Relay Rail

#### 3.12.6.1 Testing for Wear

Each relay rail shall be checked for wear by the Contractor's QC Representative in the presence of the COR after the material is delivered to the construction site. The Contractor shall monitor the installation of track for defects in rail and joint bars being installed. Rail and joint bars that are found to be defective shall not be installed in track.

## 3.12.6.2 Testing for Defects

Upon completion of the track construction, the Contractor shall have the rail tested by ultrasonic methods. Ultrasonic testing shall be done by a contractor normally engaged in this type of testing with a minimum of 5 years of experience or a technician certified to meet ANSI/ASNT CP-189 level for level III qualifications with a minimum 1 year experience in testing rail defects. The Contractor shall schedule a rail testing machine and notify the Contracting Officer of the type of machine and schedule. Contractor furnished rails which are found to be defective at that time shall be removed and replaced by the Contractor at no additional cost to the Government. Contractor furnished joint bars and compromise joint bars that are found to be cracked or broken shall be removed and replaced at no additional cost to the Government.

TABLE VII

RECORD OF ITEMS REPAIRED OR REBUILT BY THE  
ELECTRIC ARC WELDING METHOD AND GRINDING

INSTALLATION _____		TURNOUT NUMBER _____			
(Circle)					
DATE _____	TIME _____	AM/PM	AIR TEMP _____	C*	WEATHER _____
ITEM REBUILT	DESCRIPTION	WEIGHT	LENGTH	LH RH	REINFORCED
Switch Point	_____	_____	_____	_____	_____
Frog	_____	_____	_____	_____	_____
Railroad Crossing	_____	_____	_____	_____	_____
Guard Rails	_____	_____	_____	_____	_____
Switch Point Protector	_____	_____	_____	_____	_____
Rail (Ends)	_____	_____	_____	_____	_____
Rail-Engine Burns	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

\*NOTE: Determination will be made to the nearest 1/2 degree.

## RECORD OF FIELD WELD

-----  
INSTALLATION \_\_\_\_\_ WELD NUMBER \_\_\_\_\_

## FINAL INSTALLED

LOCATION \_\_\_\_\_ TRACK \_\_\_\_\_  
STATION \_\_\_\_\_ RAIL Left Right (Circle)DATE \_\_\_\_\_ TIME \_\_\_\_\_ AM  
PM (Circle)AIR TEMPERATURE \_\_\_\_\_ F\*. WEATHER \_\_\_\_\_  
RAIL TEMPERATURE \_\_\_\_\_ F\*. \_\_\_\_\_

WELD KIT MANUFACTURER \_\_\_\_\_

## RAIL GAP

NEAREST 1/16 in.) \_\_\_\_\_  
RAIL CUT REQUIRED? YES NO (Circle)

## BACK RAIL

MANUFACTURER \_\_\_\_\_ USED RAIL? YES NO (Circle)  
YEAR/MONTH ROLLED \_\_\_\_\_ HEAT NUMBER \_\_\_\_\_

## AHEAD RAIL

MANUFACTURER \_\_\_\_\_ USED RAIL? YES NO (Circle)  
YEAR/MONTH ROLLED \_\_\_\_\_ HEAT NUMBER \_\_\_\_\_REMARKS \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ULTRASONIC TEST DATE &amp; RESULTS \_\_\_\_\_

## KIT MFG. REPRESENTATIVE

PRESENT \_\_\_\_\_ WELDING FOREMAN \_\_\_\_\_  
(Initial) (Signed)

## CONTRACTING OFFICER'S

## REPRESENTATIVE

PRESENT \_\_\_\_\_ RECORDER \_\_\_\_\_  
(Initial) (Signed)\_\_\_\_\_  
(Initial) RECORDER (Signed)-----  
FOR GOVERNMENT USE ONLYULTRASONIC TEST DATE AND RESULTS \_\_\_\_\_  
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\*NOTE: Determination will be made to the nearest 1/2 degree.

-- End of Section --